Raquel Webster
Senior Counsel

December 18, 2018

BY HAND DELIVERY AND ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Docket 4888 – The Narragansett Electric Company d/b/a National Grid
2019 Energy Efficiency Program Plan
Responses to Record Requests

Dear Ms. Massaro:

I have enclosed eleven copies of National Grid's[1] responses to the record requests issued at the Rhode Island Public Utilities Commission's (PUC) evidentiary hearing on December 11, 2018 in the above-referenced docket

Thank you for your attention to this filing. If you have any questions, please contact me at 781-907-2121.

Sincerely,

Raquel J. Webster

Enclosures

cc: Dockets 4888/4889 Service Lists
Jon Hagopian, Esq.
John Bell, Division

[1] The Narragansett Electric Company d/b/a National Grid (National Grid or Company).

40 Sylvan Road, Waltham, MA 02451
T: 781-907-2121 ■ raquel.webster@nationalgrid.com ■ www.nationalgrid.com

Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.

Joanne M. Scanlon

December 18, 2018
Date

Docket No. 4888 - National Grid – 2019 Energy Efficiency Plan (EEP)
Docket No. 4889 - National Grid – 2019 System Reliability Procurement Report (SRP)
Service list updated 10/18/18

Name/Address	E-mail Distribution List	Phone
Raquel Webster, Esq. **National Grid** 280 Melrose St. Providence, RI 02907	Raquel.webster@nationalgrid.com; Joanne.scanlon@nationalgrid.com; Celia.obrien@nationalgrid.com; Rachel.henschel@nationalgrid.com; Matthew.Chase@nationalgrid.com; Timothy.Roughan@nationalgrid.com;	781-907-2121
Jon Hagopian, Esq. **Division of Public Utilities and Carriers**	Jon.hagopian@dpuc.ri.gov; Macky.McCleary@dpuc.ri.gov; Jonathan.Schrag@dpuc.ri.gov; john.bell@dpuc.ri.gov; Ronald.Gerwatowski@dpuc.ri.gov; Albert.DeMiranda@dpuc.ri.gov;	401-784-4775
Tim Woof Jennifer Kallay Synapse Energy Economics 22 Pearl Street Cambridge, MA 02139	twoolf@synapse-energy.com; jkallay@synapse-energy.com;	
Marisa Desautel, Esq. **(EERMC)** Law Office of Marisa Desautel, LLC 55 Pine St. Providence, RI 02903	marisa@desautelesq.com;	401-477-0023
Mike Guerard, Optimal Energy	guerard@optenergy.com;	
Mark E. LeBel, Esq. **Acadia Center** 31 Milk Street Suite 501 Boston, MA 02108	mlebel@acadiacenter.org; ENiedowski@acadiacenter.org;	617-742-0054 Ext. 104
Carol Grant, Commissioner	Carol.grant@energy.ri.gov;	

Office of Energy Resources (OER)	Christopher.Kearns@energy.ri.gov; Nicholas.Ucci@energy.ri.gov ; Becca.Trietch@energy.ri.gov; Carrie.Gill@energy.ri.gov ;	
Andrew Marcaccio, Esq. Dept. of Administration Division of Legal Services One Capitol Hill, 4th Floor Providence, RI 02908	Andrew.Marcaccio@doa.ri.gov;	401-222-8880
Larry Chretien, Executive Director **Green Energy Consumers Alliance**	Larry@massenergy.org;	
Original & 9 copies file w/: Luly E. Massaro, Commission Clerk Public Utilities Commission 89 Jefferson Blvd. Warwick, RI 02888	Luly.massaro@puc.ri.gov; Cynthia.WilsonFrias@puc.ri.gov; Alan.nault@puc.ri.gov; Todd.bianco@puc.ri.gov ; Margaret.hogan@puc.ri.gov ;	401-780-2107
Frederick Sneesby Dept. of Human Services	Frederick.sneesby@dhs.ri.gov;	
Douglas W. Gablinske, Executive Director The Energy Council of RI (TEC-RI)	doug@tecri.org;	
Kat Burnham, PPL	kat@ripower.org;	
Chris Vitale, Esq., RI Infrastructure Bank	cvitale@hvlawltd.com;	

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4888
In Re: 2019 Energy Efficiency Plan
Responses to Record Requests
Issued at the Commission's Evidentiary Hearing
On December 11, 2018

Record Request No. 1

Request:

(a) Referring to Bates pages 95-99 of the Plan (Attachment 1), provide the budget information for each category, broken out to program and measure level.
(b) Referring to Bates pages 199-201 (Attachment 2), provide the budget information for each category, broken out to program and measure level.
(c) For tables E2 and G2, please add a shared expense line between program categories.

Response:

(a) Please see the information in Table (a) below. The Company added additional columns and rows to provide budget information at the measure and program levels. The 'total incentive' column relates to the 'Rebates and Other Customer Incentives' columns in E2 and G2. The other budget categories are planned at a program level and are not specific to individual measures. These budgets have been included at the program level under the 'shared costs' column. For whole building programs such asEnergyWise and EnergyWise Multifamily, total incentives are planned based on the average measure mix per participant. The number of participants and planned incentive per participant are also included.

(b) Please see the information in Table (b) below and the explanation in the Company's response to subpart (a) above.

(c) The Company added shared expenses from tables E2 and G2 to responses (a) and (b) below. The 'shared costs' include the budget categories of Program Planning & Administration, Marketing, Sales, Technical Assistance & Training, and Evaluation & Market Research. These shared costs are planned at the program level and are, therefore, not measure-specific.

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Record Request No. 1, page 2

Table (a)

Electric Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
EnergyWise Single Family	ACTIMER1	13	Average Incentive based on measure mix and is applied per participant (see line below)		
	AERATOR - Duel Fuel Only	12			
	Air Sealing Kit (Oil)	83			
	LED Bulbs	205,000			
	LED Outdoor Fixture	3,481			
	Pre-Wx	513			
	Refrig rebate	91			
	Refrigerator Brush	8,486			
	SHOWERHEAD	237			
	Smart Strip	15,375			
	THERMOSTAT - Elec Heat only	864			
	THERMOSTAT - Oil Only	55			
	LED TORCHIERE1	2			
	VENTILATION - OTHER	41,072			
	WiFi Thermostat	372			
	Wx - GAS	2,049			
	Wx - OIL	1,538			
	Wx Elec - Elec Heat only	392			
	Pipe Insulation	1,978			
	Participants	10,250	$1,309	$13,414,877	
	Program Planning & Administration				$415,665
	Marketing				$414,604
	Sales, Technical Assistance & Training				$1,392,858
	Evaluation & Market Research				$139,497
EnergyWise Multi Family	AERATOR	500	Average Incentive based on measure mix and is applied per participant (see line below)		
	AERATOR Oil	40			
	AIR SEALING ELEC WITH AC	1,461			
	AIR SEALING OIL	51			
	Common Ext LED Fixture	1,200			
	Common Ext Reflector	200			
	Common Int LED Fixture	2,000			
	Common Int Reflector	400			
	Dwelling Ext LED Fixture	50			
	Dwelling Ext Reflector	3			
	Dwelling Int EISA Exempt	2,500			
	Dwelling Int Reflector	2,630			
	INSULATION ELEC WITH AC	1,100			
	INSULATION OIL	117			
	Pipe Wrap DHW Oil	65			
	Pipe Wrap Heating Oil	14			
	Refrig rebate	19			
	SHOWERHEAD Elec	220			
	SHOWERHEAD Oil	66			
	Smart Strip	4,000			
	THERMOSTAT Elec with AC	1,600			
	THERMOSTAT OIL	37			
	TSV Showerhead Elec	65			
	TSV Showerhead Oil	39			
	Common Ext LED Bulbs	1,310			
	Common Int LED Bulbs	4,370			
	Dwelling Int LED Bulbs	15,850			
	Custom	17			
	Vending Miser	9			
	Participants	4,000	$538	$2,150,000	
	Program Planning & Administration				$103,262
	Marketing				$43,815
	Sales, Technical Assistance & Training				$721,017
	Evaluation & Market Research				$46,778

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Record Request No. 1, page 3

Electric Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
Residential New Construction	CODES AND STANDARDS	1	Average Incentive based on measure mix and is applied per participant (see line below)		
	CP Home	30			
	CWASHER	60			
	DISHWASH	495			
	FIXTURES	300			
	LED Bulbs	2,000			
	Renovation Rehab CP	50			
	Refrig rebate	614			
	Renovation Rehab Tier 1 Home	30			
	Renovation Rehab Tier 2 Home	5			
	Renovation Rehab Tier 3 Home	1			
	Renovation Rehab Tier 4 Home	7			
	SHOWERHEAD	10			
	Tier 1 Home	65			
	Tier 2 Home	35			
	Tier 3 Home	7			
	Tier 4 Home	7			
	Adaptive Reuse	225			
	Participants	550	$817	$449,429	
	Program Planning & Administration				$66,991
	Marketing				$2,478
	Sales, Technical Assistance & Training				$301,421
	Evaluation & Market Research				$38,313
ENERGY STAR® HVAC	ACQIVES	65	$175	$11,375	
	ACS16SEER13EER	385	$250	$96,250	
	DOWNSIZE	49	$250	$12,250	
	DUCTSEAL1	5	$100	$500	
	Early Replacement AC - SEER 16 (EE)	12	$0	$0	
	Early Replacement AC - SEER 16 (Retire)	12	$750	$9,000	
	Early Replacement HP - SEER 16 (EE)	3	$750	$2,250	
	Early Replacement HP - SEER 16 (Retire)	3	$0	$0	
	Early Replacement HP - SEER 18 (EE)	3	$1,000	$3,000	
	Early Replacement HP - SEER 18 (Retire)	3	$0	$0	
	ECM Pumps	5,000	$100	$500,000	
	HP Mini-split QIV	75	$175	$13,125	
	HPS16SEER8.5HSPF	24	$250	$6,000	
	HPS18SEER9.6HSPF	15	$300	$4,500	
	HPS18SEER9HSPF Mini-Split	385	$250	$96,250	
	HPS20SEER11HSPF Mini-split	501	$500	$250,500	
	WiFi Thermostat - cooling and oil htg	121	$75	$9,075	
	WiFi Thermostat - cooling and gas htg	1,140	$75	$85,500	
	Oil Fuel Switching	40	$2,400	$96,000	
	Oil Fuel Switching ROF	5	$2,400	$12,000	
	Electric Resistance Fuel Switching	40	$2,400	$96,000	
	Water Heater, Heat Pump <55 gallon	800	$750	$600,000	
	Water Heater, Heat Pump >55 gallon, UEF 2.70	15	$150	$2,250	
	Heat pump finance			$40,000	
	Program Planning & Administration				$86,569
	Marketing				$108,439
	Sales, Technical Assistance & Training				$556,560
	Evaluation & Market Research				$26,565

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Record Request No. 1, page 4

Electric Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
ENERGY STAR® Products	Dehumidifier Rebate	1,093	$30	$32,775	
	Dehumidifier Recycling	516	$30	$15,486	
	Energy Star Dryer	792	$50	$39,600	
	Freezer Recycling	518	$50	$25,875	
	Ladybug Electric	60	$0	$0	
	Ladybug Gas	5	$0	$0	
	Ladybug Other	5	$0	$0	
	Pool Pump - variable	250	$500	$125,000	
	REFRIG RECYCLING	2,435	$50	$121,750	
	Refrigerator Recycling (Primary)	2,258	$50	$112,900	
	Roadrunner Gas	7	$15	$105	
	Roadrunner II Electric	72	$15	$1,080	
	Roadrunner Other	342	$15	$5,130	
	Room Air Cleaners	300	$40	$12,000	
	Smart Strip	7,411	$10	$74,106	
	Tier 2 APS	4,294	$35	$150,276	
	Room Air Conditioners	346	$40	$13,840	
	Storm Windows	100	$25	$2,500	
	Storm Windows Electric	100	$25	$2,500	
	Storm Windows Others	100	$25	$2,500	
	Program Planning & Administration				$91,385
	Marketing				$568,296
	Sales, Technical Assistance & Training				$709,765
	Evaluation & Market Research				$17,630
ENERGY STAR® Lighting	LED Bulb	1,195,100	$2.60	$3,107,260	
	LED Bulb (Specialty)	237,987	$3.40	$809,156	
	LED Bulb (Hard to Reach)	547,700	$3.50	$1,916,950	
	LED Bulb (Food Pantries)	120,000	$6.00	$720,000	
	LED Bulb (School Fundraiser)	8,183	$6.00	$49,098	
	LED Bulb (Reflectors)	411,778	$5.00	$2,058,888	
	LED Bulb (Fixture)	518,593	$9.00	$4,667,337	
	Program Planning & Administration				$401,422
	Marketing				$515,841
	Sales, Technical Assistance & Training				$638,381
	Evaluation & Market Research				$83,891
Home Energy Reports	New Mover electric	27,705	$8.68	$240,479	
	New movers dual fuel	16,065	$8.68	$139,444	
	Opt-out dual fuel	100,468	$8.68	$872,062	
	Opt-Out electric	146,911	$8.68	$1,275,187	
	Program Planning & Administration				$99,137
	Marketing				$10,915
	Sales, Technical Assistance & Training				$10,244
	Evaluation & Market Research				$19,700

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Record Request No. 1, page 5

Electric Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
Single Family - Income Eligible Services	ACREPLACE	1,290	$330	$425,700	
	APREMOV	5	$55	$275	
	Dehumidifier Rebate	600	$250	$150,000	
	Early Retirement CW Elec DHW & Elec Dryer	168	$725	$121,800	
	Early Retirement CW Gas DHW & Elec Dryer	468	$725	$339,300	
	Early Retirement CW Elec DHW & Gas Dryer	11	$725	$7,830	
	Early Retirement CW Oil DHW & Elec Dryer	372	$725	$269,700	
	Early Retirement CW Gas DHW & Gas Dryer	168	$725	$121,800	
	Early Retirement CW Propane DHW & Elec Dryer	9	$725	$6,786	
	DHWELEC	20	$10	$200	
	DHWGAS	20	$10	$200	
	DHWOIL	20	$10	$200	
	EDUC - TLC	3,000	$178	$534,000	
	FREEZER	210	$550	$115,500	
	HEATSYSTEM	360	$5,000	$1,800,000	
	LED Bulbs	60,000	$9	$540,000	
	Programmable Thermostat, Gas	10	$125	$1,250	
	Programmable Thermostat, Oil	10	$125	$1,250	
	Programmable Thermostat, Other	10	$125	$1,250	
	Refrig rebate	1,950	$1,100	$2,145,000	
	Smart Strip	3,900	$20	$78,000	
	WATERBED	3	$600	$1,800	
	Wx DelFuel	510	$4,500	$2,295,000	
	Wx Elec	24	$4,500	$108,000	
	Minisplit Heat Pumps - Electric Resistance	15	$4,000	$60,000	
	Minisplit Heat Pumps - Oil Fuel Switching	15	$4,000	$60,000	
	Program Planning & Administration				$352,995
	Marketing				$129,122
	Sales, Technical Assistance & Training				$1,820,541
	Evaluation & Market Research				$207,229
EnergyWise Income Eligible Multifamily Retrofit	AERATOR Oil	400			
	AIR SEALING OIL	196			
	Common Ext LED Fixture	1,100			
	Common Ext Reflector	66			
	Common Int LED Fixture	8,740			
	Common Int Reflector	57			
	Custom	40			
	Dwelling Ext LED Fixture	6			
	Dwelling Int LED Fixture	1,700	Average Incentive based on measure mix and is applied per participant (see line below)		
	INSULATION OIL	25			
	Participant (NEB)	5,000			
	Pipe Wrap DHW Oil	100			
	Refrig rebate	23			
	SHOWERHEAD Elec	300			
	Smart Strip	1,200			
	THERMOSTAT OIL	50			
	Common Int EISA Exempt	360			
	Dwelling Int Reflector	100			
	Vending Miser	4			
	Participants	5,000	$536	$2,682,282	
	Program Planning & Administration				$111,722
	Marketing				$9,455
	Sales, Technical Assistance & Training				$525,255
	Evaluation & Market Research				$54,189

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Record Request No. 1, page 6

Electric Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
Residential ConnectedSolutions	Thermostats New	805	$45	$36,225	
	Thermostats Existing	1,674	$25	$41,850	
	Battery Daily (number of unit)	50	$1,600	$80,000	
	Evs Peak (customers)	37	$100	$3,700	
	Water Heater Daily (units)	10	$25	$250	
	Behavioral Peak (customers)	286,703	$0	$0	
	Program Planning & Administration				$8,651
	Marketing				$8,651
	Sales, Technical Assistance & Training				$103,783
	Evaluation & Market Research				$0

Gas Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
EnergyStar® HVAC	BOILER RESET	20	$100	$2,000	
	Boiler90	200	$450	$90,000	
	Boiler95	325	$800	$260,000	
	COMBO CONDENSING	85	$600	$51,000	
	COMBO CONDENSING 95	700	$1,200	$840,000	
	COND WATER HEATER 0.80 UEF	5	$250	$1,250	
	Furnace95ECM	345	$300	$103,500	
	Furnace97ECM	40	$500	$20,000	
	HEAT RECOVERY VENT	5	$250	$1,250	
	WATER HEATER .64 UEF (med draw)	40	$100	$4,000	
	WATER HEATER .68 UEF (high draw)	40	$100	$4,000	
	ON DEMAND WATER HEATER 0.87 UEF	350	$600	$210,000	
	WiFi Thermostat - cooling and htg	250	$75	$18,750	
	WiFi Thermostat - gas ht only	750	$75	$56,250	
	Programmable Thermostat	60	$25	$1,500	
	Combo Furnace	90	$700	$63,000	
	Program Planning & Administration				$67,361
	Marketing				$120,042
	Sales, Technical Assistance & Training				$247,247
	Evaluation & Market Research				$3,753
EnergyWise	Aerator	160	Average Incentive based on measure mix and is applied per participant (see line below)		
	Weatherization	2,300			
	Air Sealing Kit (Gas)	500			
	Showerhead	300			
	Pipe Wrap	5,000			
	THERMOSTAT	410			
	WiFi THERMOSTAT	200			
	Participants	2,300	$2,867	$6,594,750	
	Program Planning & Administration				$239,451
	Marketing				$78,280
	Sales, Technical Assistance & Training				$1,534,137
	Evaluation & Market Research				$19,636

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Record Request No. 1, page 7

Gas Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
EnergyWise Multifamily	Air Sealing	3,900	Average Incentive based on measure mix and is applied per participant (see line below)		
	Custom Non-Lighting	58			
	Participant	4,000			
	Duct Sealing	10			
	Faucet Aerator	1,866			
	Insulation	3,200			
	Pipe Wrap (Water Heating)	882			
	Programmable Thermostat	833			
	Thermostatic Shut-off Valve	300			
	TSV Showerhead	519			
	WiFi thermostat gas	500			
	Participants	4,000	$304	$1,216,000	
	Program Planning & Administration				$64,464
	Marketing				$34,026
	Sales, Technical Assistance & Training				$356,046
	Evaluation & Market Research				$6,989
Home Energy Reports	New movers dual fuel	14,520	$3.86	$56,091	
	Opt-out dual fuel	75,803	$3.86	$292,836	
	Opt-out gas only	17,091	$3.86	$66,024	
	Program Planning & Administration				$21,516
	Marketing				$859
	Sales, Technical Assistance & Training				$5,117
	Evaluation & Market Research				$5,459
Residential New Construciton	CODES AND STANDARDS	1	Average Incentive based on measure mix and is applied per participant (see line below)		
	CP	35			
	CP-DHW	35			
	RR CP	30			
	RR CP-DHW	30			
	RR Tier 1	48			
	RR Tier 1 - DHW	48			
	RR Tier 2	20			
	RR Tier 2 - DHW	20			
	RR Tier 3	1			
	RR Tier 3 - DHW	1			
	SHOWERHEAD	50			
	Tier 1	73			
	Tier 1 - DHW	73			
	Tier 2	70			
	Tier 2 - DHW	70			
	Tier 3	26			
	Tier 3 - DHW	26			
	Tier 4	10			
	Tier 4 - DHW	10			
	Adaptive Reuse	75			
	Participants	313	$1,624	$508,385	
	Program Planning & Administration				$23,587
	Marketing				$3,187
	Sales, Technical Assistance & Training				$186,703
	Evaluation & Market Research				$15,774

Record Request No. 1, page 8

Gas Programs					
Program	**Measure**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
Single Family - Income Eligible Services	Heating System Replacement	220	$4,900	$1,078,000	
	Weatherization	600	$4,500	$2,700,000	
	Program Planning & Administration				$148,686
	Marketing				$14,870
	Sales, Technical Assistance & Training				$1,029,821
	Evaluation & Market Research				$41,465
Income Eligible Multifamily	Air Sealing_LI	1,554	Average Incentive based on measure mix and is applied per participant (see line below)		
	BOILER Commercial_LI	32			
	BOILER_LI	15			
	CUST NON-LGT_LI	50			
	Faucet Aerator_LI	4,800			
	Insulatioin_LI	1,884			
	Low-Flow Showerhead_LI	1,100			
	Participant (NEB)_LI	3,500			
	Pipe Wrap (Water Heating)_LI	700			
	Programmable Thermostat_LI	350			
	TANK WH_LI	0			
	Thermostatic Shut-off Valve_LI	0			
	TSV Showerhead_LI	0			
	Wifi Thermostat gas_LI	350			
	Participants	3,500	$707	$2,474,500	
	Program Planning & Administration				$92,316
	Marketing				$10,296
	Sales, Technical Assistance & Training				$348,872
	Evaluation & Market Research				$6,710

Record Request No. 1, page 9

Table (b)

Electric Programs					
Program	**Subprogram**	**Net Annual kWh Goal by Subprogram**	**Incentive / Net Annual kwh**	**Total Incentives**	**Shared Costs**
Large Commercial New Construction	C&I Codes	276,821	$0.00	$0	
	D2 CAIR	886,800	$0.23	$204,000	
	D2 HVAC	1,088,493	$0.40	$440,058	
	D2 Custom	6,459,680	$0.26	$1,679,000	
	D2 Lights	1,984,215	$0.24	$485,000	
	D2 VSD	166,718	$0.29	$48,000	
	Commercial Demonstrations & Assessments			$75,000	
	Program Planning & Administration				$281,821
	Marketing				$377,509
	Sales, Technical Assistance & Training				$1,310,956
	Evaluation & Market Research				$134,801
Large Commercial Retrofit	CHP	421,000	$0.30	$125,000	
	EI Custom	27,052,618	$0.22	$5,868,840	
	EI HVAC	1,962,567	$0.22	$425,000	
	EI Light	20,015,888	$0.21	$4,145,000	
	EI VSDs	2,345,300	$0.21	$500,000	
	Street Lighting	3,776,370	$0.22	$843,618	
	Upstream Lighting	17,439,184	$0.21	$3,703,664	
	Program Planning & Administration				$851,876
	Marketing				$288,042
	Sales, Technical Assistance & Training				$3,917,209
	Evaluation & Market Research				$688,275
Small Business Direct Install	SCI	12,162,756	$0.57	$6,985,000	
	Commercial Demonstrations & Assessments			$180,000	
	Program Planning & Administration				$356,887
	Marketing				$356,652
	Sales, Technical Assistance & Training				$459,263
	Evaluation & Market Research				$374,998
Program	**Subprogram**	**Demand Response kW Goal**	**Incentive / Net Annual kW**	**Total Incentives**	**Shared Costs**
Commercial Connected Solutions	Daily DR Resources	2,300	$300	$690,000	
	Peak Shaving DR (MW)	32,000	$35	$1,120,000	
	Program Planning & Administration				$12,195
	Marketing				$6,474
	Sales, Technical Assistance & Training				$195,465
	Evaluation & Market Research				$0

Record Request No. 1, page 10

Gas Programs						
Program	**Measure Groups**	**MMBtus**	**Units**	**Incentive / Unit**	**Total Incentives**	**Shared Costs**
Large Commercial New Construction	Boiler95	984	40	$1,500	$60,000	
	CODES AND STANDARDS	343	1	N/A	$0	
	COMBO COND BOIL/WTR HTR 90+	653	30	$1,500	$45,000	
	COND UNIT HEATER 151-400 MBH	181	5	$750	$3,750	
	Condensing boiler <= 300 mbh	65	5	$1,500	$7,500	
	Condensing boiler 1000-1700 mbh	647	8	$7,500	$58,000	
	Condensing boiler 1701+ mbh	1,463	10	$10,000	$100,000	
	Condensing boiler 300-499 mbh	248	10	$2,000	$20,000	
	Condensing boiler 500-999 mbh	864	19	$4,000	$76,000	
	COOKING-COMBO OVEN 1	297	3	$1,000	$3,000	
	COOKING-CONVECTION OVEN 1	571	50	$1,150	$57,500	
	COOKING-CONVEYOR OVEN 1	235	3	$1,000	$3,000	
	COOKING-FRYER-1000	5,395	120	$1,150	$138,000	
	COOKING-STEAMER-1000	280	3	$1,000	$3,000	
	Furnace95ECM	30	6	$500	$3,000	
	Furnace97ECM	12	2	$800	$1,600	
	INFRARED HEATER - LOW INT	266	25	$750	$18,750	
	WATER HEATER TANK 0.67 EF	298	400	$111	$44,200	
	Water Heating Boiler - 85% TE	47	400	$111	$44,200	
	Water Heating Boiler - 92% TE	112	400	$111	$44,200	
	COMBO COND BOIL/WTR HTR 95+	3,943	400	$111	$44,200	
	COND WATER HEATER 90%MIN 75-800	2,858	400	$111	$44,200	
	Custom	22,745	34	Up to 75% of Total Resource Cost	$454,905	
	Program Planning & Administration					$82,407
	Marketing					$193,656
	Sales, Technical Assistance & Training					$743,357
	Evaluation & Market Research					$95,806
Large Commercial Retrofit	BOILER RESET 1 STAGE	177	5	$225	$1,125	
	Builder Operator Certification	1,667	5	$518	$2,590	
	LF_SHWR_HD_1.75_GPM_DI	104	20	$200	$4,000	
	Pre Rinse Spray Valve	341	30	$25	$750	
	STEAM TRAPS	1,677	200	$50	$10,000	
	THERMOSTAT	16	5	$25	$125	
	WiFi Thermostat - cooling and htg	33	5	$100	$500	
	WiFi Tstat-heat only	132	20	$100	$2,000	
	Custom Retrofit	150,903	123	Up to 50% of Total Resource Cost	$2,610,615	
	Program Planning & Administration					$194,656
	Marketing					$293,003
	Sales, Technical Assistance & Training					$887,736
	Evaluation & Market Research					$206,865
Small Business Direct Install	FAUCET_AERATOR_0.5_DI	302	180	$11	$1,980	
	INSUL_PIPE_DI_1.5IN_H2O	21	100	$6	$560	
	INSUL_PIPE_DI_2IN_H2O	3	8	$8	$62	
	LF_PRE_RINSE_SPRAY_NZL	607	54	$100	$5,400	
	LF_SHWR_HD_1.75_GPM_DI	795	155	$25	$3,798	
	SALON_NOZZLE	201	10	$100	$1,000	
	THERMOSTAT	631	200	$126	$25,200	
	Program Planning & Administration					$5,263
	Marketing					$26,859
	Sales, Technical Assistance & Training					$37,618
	Evaluation & Market Research					$4,707

Record Request No. 1, page 11

Gas Programs						
Program	**Measure**	**MMBtus**		**Incentive / Unit**	**Total Incentives**	**Shared Costs**
C&I Multifamily	Air Sealing_MF	3,645		Average Incentive based on measure mix		
	CUST NON-LGT_MF	3,762				
	Faucet Aerator_MF	367				
	Insulation_MF	7				
	Low-Flow Showerhead_MF	82				
	Pipe Wrap (Water Heating)_MF	41				
	Programmable Thermostat_MF	1,578				
	TSV Showerhead_MF	406				
	WiFi thermostat gas_MF	940				
	Participants	2,289		$378	$756,000	
	Program Planning & Administration					$28,923
	Marketing					$16,361
	Sales, Technical Assistance & Training					$109,738
	Evaluation & Market Research					$7,347

Prepared by or under the supervision of: John Richards

Record Request No. 2

Request:

Please confirm the benefit cost ratios in the Company's response to PUC 1-23 and explain why the number in the first column on page 3 does not fall between the number in the second column on page 3 and the number in the BCA ratio column on page 2. Please demonstrate the math.

Response:

The Company reviewed the BCA ratios calculated in PUC 1-23 and has updated the values as outlined below. Values with asterisks beside them have been corrected from the Company's response to PUC 1-23. With these corrections, all values follow the logic referenced in this record request.

Commercial New Construction	**BCA Ratio**	**Benefits ($1,000)**	**Costs ($1,000)**
Total with Demonstrations	6.69	$36,177	$5,406
Performance Based Procurement (Accelerate Performance)	*1.90*	*$804*	*$423*
Total without Demonstrations	7.10*	$35,373	$4,983

The 1.9 BCA ratio estimates the cost effectiveness of a sample Performance Based Procurement project. Performance Based Procurement encourages building owners and developers to specify energy performance targets and include them in the project request for proposals (RFP), with the goal of decreasing building energy use relative to code. The costs included in this BCA reflect the costs to encourage the customer to take action and issue an RFP (as included in PUC 1-22) and the estimated costs associated with the anticipated energy efficiency measures that would be installed as part of a Performance Based Procurement project. The savings included in this BCA represent the savings that would result from those anticipated measures.

In calculating the BCA ratio for the Commercial New Construction program with and without demonstrations as originally included in PUC 1-23, savings and costs were subtracted from the overall program savings and costs to arrive at a BCA ratio without demonstrations. These costs included the cost to the program to implement Performance Based Procurement, but it did not include the actual cost of installing the energy efficient equipment in the buildings participating in this program, causing the BCA ratio to be lower than expected. The Company corrected this in the above table with the correct resulting BCA of 7.10.

Prepared by or under the supervision of: Courtney Lane

Record Request No. 2, page 2

Commercial Retrofit	**BCA Ratio**	**Benefits ($1,000)**	**Costs ($1,000)**
Total with Demonstrations	7.01	$231,722	$33,046
Strategic Energy Management (SEM)	*1.45*	*$523*	*$361*
Implement Underutilized Energy Efficiency Technologies on Mechanical Power Transmission Systems	*6.30*	*$478*	*$76*
Total without Demonstrations	7.08*	$230,926	$32,642

The Company has corrected the BCA ratio for Commercial Retrofit without Demonstrations in the above table. When originally calculating the overall program BCA ratio without demonstrations, savings and costs associated with SEM were removed from the Custom sub-program. Because the average measure life of a custom measure is longer than the measure life of a SEM measure, this reduced the benefits by a greater amount than the amount actually attributable to SEM, resulting in an overall program BC ratio that was too low, 6.97 versus the correct value of 7.08.

Direct Install	**BCA Ratio**	**Benefits ($1,000)**	**Costs ($1,000)**
Total with Demonstrations	2.79	$31,386	$11,269
Heat Pump Demonstration	*1.02**	*$276*	*$271*
Total without Demonstrations	2.83*	$31,111	$10,999

In the Company's response to PUC 1-23, the BCA ratio given for the Direct Install Heat Pump Demonstration had incorrectly been modeled off the residential heat pump offerings and was not specific to Direct Install. That is corrected here with the BCA ratio changing from 2.8 to 1.02. When the corrected assumptions for the Heat Pump Demonstration are removed from the overall program's benefits and costs, the overall BCA ratio increases, as expected.

Record Request No. 3

Request:

Is there anything new in the 2019 Plan that is not listed as a demonstration? If yes, please explain why it is not listed as a demonstration. (Exclude anything that is new and is already listed as an assessment or pilot).

Response:

The below listed new initiatives, measures, and solutions proposed in 2019 are not listed as demonstrations as a demonstration by definition (Bates page, 0326), "tests a new technology or solution that is delivered as part of an existing program where a technical assessment has estimated the savings and determined that the measure is likely to be cost effective."

A demonstration is a go-to market strategy of a solution (that may be a bundle of measures) where savings are estimated but need to be tested in the market. A demonstration validates impacts assumptions as well as process impacts (market adoption, customer value for a new technology or solution).

The new measures, solutions, and program expansions listed below do not qualify as demonstrations as in all cases the initiative, measure, or go-to market strategy have proven savings or tested market adoption, known customer value or provide transparency and ease or increase in participation in the existing program. For example in the case of Portfolio Manager automatic data uploads and a web based landing page for the community initiative promotes the ease in participation in energy efficiency programs.

Commercial and Industrial (C&I): New in 2019

- Code change: Change in eligibility of projects from 15% to 20% above code for Whole Building approach
- State's newly developed Stretch code adopted in 2019 will be supported by the Company, with training and technical expertise
- Portfolio Manager automatic data upload: In 2019 customers can automatically upload aggregate, whole building usage data, both electric and gas onto EPA portfolio Manager
- Schools initiative: In 2019 the Company is looking to propose a comprehensive approach to school districts for EE improvements
- Small Business classification
- Hospitality Initiative
- Restaurants Initiative
- Industrial Initiative – Serving smaller manufacturers

Record Request No. 3, page 2

Residential: New in 2019

- Revised multifamily participation guidelines to remove barriers and serve more customers
- Parity of delivered fuel incentives
- Expanded air source heat pump deployment
- Online scheduling of EnergyWise assessments
- 100% landlord incentive for market rate, single family residences
- More personalized Home Energy Reports tips
- Heat pump initiative within HVAC
- Upstream Heat Pump Water Heater incentive
- Low-e storm windows
- New web landing page for community initiative
- Expanding community program to four communities from two
- Promoting workforce development

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4888
In Re: 2019 Energy Efficiency Plan
Responses to Record Requests
Issued at the Commission's Evidentiary Hearing
On December 11, 2018

Record Request No. 4

Request:

(a) What was proposed in the Three-Year Plan for heat pumps?
(b) What would be the proposal if the 2019 EE Plan included only the Three-Year Plan proposal and the proposal included in the original settlement agreement PST docket concerning heat pumps?
(c) What is the current 2019 EE Plan proposal? Please note what units the Company is using to indicate the number of units in each proposal.

Response:

Following the written response is a table that represents the numbers outlined below. The numbers below refer to the cell(s) in the table)

a) The total number of single family homes and multifamily housing units included in the 2019 within the Rhode Island 2018 – 2020 Energy Efficiency Plan: **77** (Cell A10)
    i. Market Rate Single Family (SF) Homes: **55** (Sum: Cell A1+Cell A2+Cell A3)
        1. Market rate SF - oil fuel switching: 17 (A1)
        2. Market rate SF - oil fuel switching replace on failure: 8 (A2)
        3. Market rate SF - electric resistance fuel switching: 30 (A3)

    ii. Income Eligible Single Family Homes: 0 (Sum: A4+A5+A6)

    iii. Multifamily Income Eligible Housing Units: **22** (Sum: A7+A8+A9)
        1. MF income eligible - oil fuel switching: 0 (A7)
        2. MF income eligible - oil fuel switching replace on failure: 0 (A8)
        3. MF income eligible - electric resistance fuel switching: 22 (A9)

b)
    a. Only the Three-Year Plan proposal: **77** single family homes and multifamily housings units. (A10)
    b. Three Year Plan Proposal PLUS the original settlement agreement Power Sector Transformation docket for heat pumps: **164** single family homes (A10+B10=C10)

Prepared by or under the supervision of: Laura Rodormer

Record Request No. 4, page 2

c) The total number of single family homes and multifamily units for 2019: **190** (D10)

i. Market Rate Single Family (SF) Homes: **85** (D1+D2+D3)
   1. Market rate SF - oil fuel switching: 40 (D1)
   2. Market rate SF - oil fuel switching replace on failure: 5 (D2)
   3. Market rate SF - electric resistance fuel switching: 40 (D3)

ii. Income Eligible Single Family (SF) Homes: **30** (D4+D5+D6)
   1. Income eligible SF - oil fuel switching: 15 (D4)
   2. Income eligible SF - oil fuel switching replace on failure: 0 (D5)
   3. Income eligible SF - electric resistance fuel switching: 15 (D6)

iii. Multifamily (MF) Income Eligible Housing Units: **75** (D7+D8+D9)
   1. MF income eligible - oil fuel switching: 15 (D7)
   2. MF income eligible - oil fuel switching replace on failure: 0 (D8)
   3. MF income eligible - electric resistance fuel switching: 60 (D9)

Record Request No. 4, page 3

			A	B	C	D
			2018-2020 3YR Plan 2019 Values*	Power Sector Transfomation 2019 Values*	2018-2020 3YP Plus PST 2019 Values*	2019 Annual Plan 2019 Values*
1	HVAC Electric	Oil Fuel Switching	17	65	82	40
2		Oil Fuel Switching Replace on Failure	8	0	8	5
3		Electric Resistance Fuel Switching	30	9	39	40
4	Income Eligible	Oil Fuel Switching	0	12	12	15
5		Oil Fuel Switching Replace on Failure	0	0	0	0
6		Electric Resistance Fuel Switching	0	1	1	15
7	MF Income Eligible	Oil Fuel Switching	0	0	0	15
8		Oil Fuel Switching Replace on Failure	0	0	0	0
9		Electric Resistance Fuel Switching	22	0	22	60
10		TOTAL	77	87	164	190

* 2019 Values represents the number of homes/housing units that will receive air source heat pumps as primary heat source. Housing units included for MF Income Eligible Heat Pumps in the above table are estimated based off planned budget allocation.

Prepared by or under the supervision of: Laura Rodormer

Record Request No. 5

Request:

(a) How many new residential gas heating customers will there be in 2019?
(b) How many of those are new construction; and
(c) How many of those are conversions/ switching from other heating fuels? Please include the 2018 information if it is readily and easily available.

Response:

Per the Company's New England Gas Resource Planning and Customer Connections teams, the numbers below account for the Residential and Commercial Gas Growth customers in RI, FY18 Actuals (through 12/12/18) and FY19 estimated.

Following the written response is a table that represents the numbers outlined below. The numbers below refer to the cell(s) in the table.

(a) The estimated number of new residential and commercial gas heating customers in 2019: 1,720 (C1)

(b) At this time, a breakdown of the total gas growth numbers to conversions and New Construction is not available. Additional time would be required to provide the breakdown as it is a manual process in Rhode Island.

(c) Refer to (b). The 2018 information is included below (Column A)

		A	B
		2018 as of 12/12/18	2019 Estimated
1	Rhode Island Gas Growth Services (gas heating customers) - **Total**	1,383*	1,720*

*Numbers account for Residential and Commercial Gas Growth customers in RI.

Prepared by or under the supervision of: Laura Rodormer

Record Request No. 6

Request:

Are there any scripts/training materials that the call center employees use to support the following statement on bates page 86 of the Plan: "In 2019, the Company will continue coordination between the High Efficiency Gas Program and the Gas Sales Program to promote high efficiency heating systems during the gas conversion process?" If so, please provide.

Response:

When a customer contacts the Gas Conversion Department at 1-877-696-4743, a customer service representative will go through the Lead Intake Inbound Script attached as Attachment RR-6(a) with the customer.

The customer service representative will also provide pricing information. If appropriate, based on the attached "Massachusetts and Rhode Island Eligible Residential Heating Equipment and Pricing, Offer Effective July 1 - December 31, 2018" sheet, which is included as Attachment RR-6(b).

If a customer calls the National Grid Rebate Processing Center (1-877-316-9491), the customer service representative will direct the customer to the Gas Conversion Department and will advise the customer of the available energy efficient heating rebates.

Lead Intake Inbound Script—Check for Gas Availability

National Grid Rep: Thank you for calling National Grid this is _____. How may I help you today?

Customer: Allow customer to complete inquiry statement.

National Grid: Before we proceed, I need to obtain some information from you.

National Grid Rep: May I have your name? (If customer gives name make sure to use Customer's name at least twice during conversation--At the beginning and at the end)
May I have a telephone number in case this call gets disconnected?
*Verify and read back the phone # to customer *

National Grid Agent: Can I please verify the spelling or your name? May I repeat back your phone # to you?

May I have an e-mail address?

National grid agents Can I spell out and verify your email address and can you confirm this being correct? Spell out and Verify email address with customer *

What is the address of the property you are interested in converting to gas?
What are the city and state and zip code?
May I verify and repeat back to you the information you have provided me?

Are you the owner of the property?

Any good methodology should help your sales team enhance their selling skills, shorten the sales cycle, and close more of the right kind of deals.
Are you using gas for any appliances?
What kind of appliances you have?
Did you we special incentives' for equipment bought thru national grids web link?
Are you interested in more energy efficient equipment?
Create value in the mind of the buyer, and/or when resources are wasted on opportunities that are not adequately qualified.
Is this a Residential or a Commercial property?
How many units?
What type of heating system do you currently have? (Steam, Forced Hot Water, Forced Hot Air)
How old is your system?
Where is your oil tank located?
Did you receive any material from National Grid that prompted this call? If customer gives you a tracking code make sure to update this in Grid force

Leaving notes during points of contact with the customer and verify it saved

Allow customer to answer each question.

National Grid Rep: Thank you for this information. May I place you on hold for a moment, while I check if there is a gas line that is accessible to your home?
Wait until customer agrees to be placed on hold.

IF GAS MAIN RUNS IN FRONT OF PROPERTY:

National Grid Rep: Mr. /Mrs. thank you for holding. There is a gas line that runs in front of your home.
Is your house located on a ledge or a hill?
Is there a Retaining Wall?
Do you know if your street has been recently paved?

Depending on the territory proceed to explain service line pricing if necessary.

National Grid Rep: In addition to this National Grid is currently offering new Heating Equipment at discounted prices?
Provide customer with Campaign Offering Specific to their area.

National Grid Rep: Ask customer if they would like to schedule an appointment with one of our Value Plus Installers for a free no obligation estimate to convert from oil to gas.

***When scheduling an appointment for a Value Plus Installer. Ensure that the customer is given the Plumber's information so that they can contact the plumber if they do not hear from them.

If this is a Long Island customer, it is Mandatory that the customer be given an alternate plumber---The alternate plumber must be noted on the Sales Op*** Grade on making sure two plumbers are assigned

National Grid Rep: If you have any additional inquiries regarding the conversion process please contact your Residential Sales associate (Name of Rep) at (781) xxx-xxxx or by e-mail.
Verify and recap the information taken from the customer*

Closing: Is there anything else I can assist you with
If customer answers no--
Mr. /Ms. Xxxxx, Thank you for calling National Grid. Have a good day

Account must be noted with all information pertaining to customer—If you mailed paperwork, notes must reflect Mailed checklist, Service line application, or Heating Equipment Order Form.

Leaving notes during points of contact with the customer and verify it saved

If gas main does not run in front of property

National Grid Rep: Advise customer that gas line does not run in front of the property. Place request in Gas Availability Queue and advise customer that someone will contact them within 3 to 5 business days.

Verify and recap the information taken from the customer*

National Grid Rep: Mr. / Mrs. thank you for contacting National Grid. Have a good day.

Leaving notes during points of contact with the customer and verify it saved

Lead Intake Inbound Script—Gas on site

National Grid Rep: Thank you for calling National Grid this is _____. How may I help you today?

Customer: Allow customer to complete inquiry statement.

National Grid Agent: Before we proceed, I need to obtain some information from you.

National Grid Agent: May I have your name? (If customer gives name make sure to use Customer's name at least three times during conversation)
*Verify spelling of name first and last *

May I have a telephone number in case this call gets disconnected?
*Verify and read back the phone # to customer *

May I have an e-mail address?

- Spell out and Verify email address with customer *

What is the address of the property you are interested in converting to gas?
*Verify address and Street spelling town, Zip code etc... *

Are you the owner of the property?
Are you using gas for any appliances?
Is this a Residential or a Commercial property?
How many units?
What type of heating system do you currently have? (Steam, Forced Hot Water, Forced Hot Air)
How old is your system?
Are you using gas for any appliances?
What kind of appliances you have?
Did you we special incentives' for equipment bought thru national grids web link?
Are you interested in more energy efficient equipment?

Where is your oil tank located?
Did you receive any material from National Grid that prompted this call? If customer gives you a tracking code make sure to update this in Onyx.

Allow customer to answer each question.

National Grid Rep: National Grid is currently offering new Hating Equipment at discounted prices.
*Also Equipment that is energy efficient *

Provide customer with Campaign Offering Specific to their area.

National Grid Rep: Ask customer if they would like to schedule an appointment with one of our Value Plus Installers for a free no obligation estimate to convert from oil to gas.

***When scheduling an appointment for a Value Plus Installer. Ensure that the customer is given the Plumber's information so that they can contact the plumber if they do not hear from them.

If this is a Long Island customer, it is Mandatory that the customer be given an alternate plumber---The alternate plumber must be noted on the Sales Op***
Offer two different plumbers so the customer has options

National Grid Rep: If you have any additional inquiries regarding the conversion process please contact your Residential Sales associate (Name of Rep) at (781) xxx-xxxx or by e-mail.
Verify and recap the information taken from the customer*

Closing: Is there anything else I can assist you with?
If customer answers no--
Mr. /Ms. xxxxx Thank you for calling National Grid. Have a good day.

Account must be noted with all information pertaining to customer—If you mailed paperwork, notes must reflect Mailed checklist, Service line application, or Heating Equipment Order Form.

National Grid Rep: Mr. / Mrs. Thank you for contacting National Grid. Have a good day.

Leaving notes during points of contact with the customer and verify it saved

Massachusetts and Rhode Island Eligible Residential Heating Equipment and Pricing

nationalgrid

National Grid requires contractors to supply customers with the most efficient equipment models available for their home.
All Equipment is required to be ordered online at www.conversionprogram.net

Offer effective:
July 1 - December 31, 2018

	Model #	Input	AFUE	Equipment Price	MA Upcharge 6.25% Tax Included	RI Upcharge 7.0% Tax Included	Visa Rebate Card	MA EE Mail-In Rebates	RI EE Mail-In Rebates
BURNHAM HE COMBI & HEATING BOILERS									
K2 Water Tube Combi *Available February 1, 2018*	K2WTC-135B-6T00 Combi	135,000	95.0%	$1,676.60	$1,781.39	$1,793.96	$ 400.00	$1,600	$1,200
	K2WTC-180B-6T02 Combi	180,000	95.0%	$2,033.93	$2,161.05	$2,176.31	$ 400.00	$1,600	$1,200
Aspen Fire Tube Combi	ASPNC-155A-6LT00 Combi	155,000	95.0%	$2,857.08	$3,035.65	$3,057.08	$ 300.00	$1,600	$1,200
K2 Series Condensing Water Tube 10:1	K2WT-080B-6T00	80,000	95.0%	$1,703.29	$1,809.75	$1,822.52	$ 300.00	$1,500	$ 800
	K2WT-100B-6T00	100,000	95.0%	$1,758.34	$1,868.24	$1,881.42	$ 300.00	$1,500	$ 800
	K2WT-120B-6T00	120,000	95.0%	$1,851.73	$1,967.46	$1,981.35	$ 300.00	$1,500	$ 800
	K2WT-150B-6T00	150,000	95.0%	$2,005.07	$2,130.39	$2,145.42	$ 300.00	$1,500	$ 800
	K2WT-180B-6T02	180,000	95.0%	$2,142.74	$2,276.66	$2,292.73	$ 300.00	$1,500	$ 800
Aspen Condensing Fire-Tube 10:1	ASPN-085A-6L00M	85,000	96.0%	$2,142.56	$2,276.47	$2,292.54	$ 300.00	$1,500	$ 800
	ASPN-110A-6L00M	110,000	96.0%	$2,252.65	$2,393.44	$2,410.34	$ 300.00	$1,500	$ 800
	ASPN-155A-6L00M	155,000	95.0%	$2,637.26	$2,802.09	$2,821.87	$ 300.00	$1,500	$ 800
	ASPN-205A-6L00M	205,000	95.0%	$3,213.70	$3,414.56	$3,438.66	$ 300.00	$1,500	$ 800
	ASPN-270A-6L00M	270,000	95.0%	$3,823.27	$4,062.22	$4,090.90	$ 300.00	$1,500	$ 800
Alpine Condensing 5:1 *Alpine 500-800 available, see Portal for Pricing*	ALP080BW-4T02	80,000	95.0%	$2,470.86	$2,625.29	$2,643.82	$ 325.00	$1,500	$ 800
	ALP105BW-4T02	105,000	95.0%	$2,727.93	$2,898.43	$2,918.89	$ 500.00	$1,500	$ 800
	ALP150BW-4T02	150,000	95.0%	$3,155.16	$3,352.36	$3,376.02	$ 500.00	$1,500	$ 800
	ALP210BW-4T02	210,000	95.0%	$3,541.69	$3,763.05	$3,789.61	$ 600.00	$1,500	$ 800
	ALP285BF-4T07	285,000	95.0%	$4,897.95	$5,204.07	$5,240.81	$1,000.00	$1,500	$ 800
	ALP399BF-2L07	399,000	94.1%	$6,683.80	$7,101.54	$7,151.67	$ 600.00	$1,500	$ 800
BURNHAM MID-EFFICIENCY BOILERS									
Series 2 - Forced Hot Water, Natural Draft *Sizes 207-210: See Portal for Inputs / AFUE's / Pricing*	202NIL-TEI2	37,500	82.3%	$1,513.72	$1,608.33	$1,619.68	$ 580.00	$ 0	$ 0
	203NIL-TEI2	62,000	82.6%	$1,695.40	$1,801.36	$1,814.08	$ 715.00	$ 0	$ 0
	204NIL-TEI2	96,000	82.3%	$1,819.85	$1,933.60	$1,947.24	$ 765.00	$ 0	$ 0
	205NIL-TEI2	130,000	82.0%	$2,047.15	$2,175.09	$2,190.45	$ 895.00	$ 0	$ 0
	206NIL-TEI2	164,000	82.0%	$2,357.15	$2,504.47	$2,522.15	$1,050.00	$ 0	$ 0
ES2 Series - Forced Hot Water, Natural Vent *See Portal for sizes ES27-ES29 Pricing*	ES23NI-T	70,000	85.0%	$1,776.70	$1,887,75	$1,901.10	$ 475.00	$ 0	$ 0
	ES24NI-T	105,000	85.0%	$1,946.77	$2,068.45	$2,083.05	$ 510.00	$ 0	$ 0
	ES25NI-T	140,000	85.0%	$2,179.14	$2,315.34	$2,331.68	$ 585.00	$ 0	$ 0
	ES26NI-T	175,000	85.0%	$2,488.48	$2,644.01	$2,662.68	$ 695.00	$ 0	$ 0
ESC Series - Forced Hot Water, Direct Vent *See Portal for ESC7 - ESC9 Pricing*	ESC3NI-TS	61,000	85.5%	$2,010.43	$2,136.09	$2,151.16	$ 705.00	$ 0	$ 0
	ESC4NI-TS	91,000	85.4%	$2,133.39	$2,266.73	$2,282.73	$ 695.00	$ 0	$ 0
	ESC5NI-TS	122,000	85.3%	$2,365.75	$2,513.61	$2,531.35	$ 765.00	$ 0	$ 0
	ESC6NI-TS	152,000	85.2%	$2,675.05	$2,842.24	$2,862.30	$ 820.00	$ 0	$ 0
Independence Series - Steam Natural Draft	PIN4SNI-ME2	105,000	82.0%	$2,279.20	$2,421.65	$2,438.75	$ 925.00	$ 0	$ 0
	PIN5SNI-ME2	140,000	82.0%	$2,613.11	$2,776.43	$2,796.03	$1,075.00	$ 0	$ 0
	PIN6SNI-ME2	175,000	82.1%	$2,942.44	$3,126.34	$3,148.41	$1,210.00	$ 0	$ 0
	PIN7SNI-ME2	210,000	82.1%	$3,237.23	$3,439.56	$3,463.83	$1,335.00	$ 0	$ 0
Independence INPV Series - Steam, Power Vented	IN3PVNI-M2	62,000	83.2%	$2,123.35	$2,256.06	$2,271.98	$ 605.00	$ 0	$ 0
	IN4PVNI-M2	105,000	82.2%	$2,451.13	$2,604.33	$2,622.71	$ 690.00	$ 0	$ 0
	IN5PVNI-M2	140,000	82.2%	$2,866.45	$3,045.60	$3,067.10	$ 810.00	$ 0	$ 0
	IN6PVNI-M2	175,000	82.2%	$3,221.89	$3,423.26	$3,447.42	$ 915.00	$ 0	$ 0
AMERICAN STANDARD EQUIPMENT									
Furnace Standard Equipment	AUD1A040A9241B	40,000	80.0%	$ 357.00	$ 379.31	$ 381.99	N/A	$ 0	$ 0
	AUD1A060A9241B	60,000	80.0%	$ 382.00	$ 405.88	$ 408.74	N/A	$ 0	$ 0
	AUD1B080A9241B	80,000	80.0%	$ 408.00	$ 433.50	$ 436.56	N/A	$ 0	$ 0
	AUD1B100A9361B	100,000	80.0%	$ 424.00	$ 450.50	$ 453.68	N/A	$ 0	$ 0
	AUD1D120A9601B	120,000	80.0%	$ 467.00	$ 496.19	$ 499.69	N/A	$ 0	$ 0
Furnace Ultra-High Efficiency Equipment ENERGY STAR® with Electronically Commutated Motor	S9V2B040U3VSAA	40,000	97.0%	$1,220.00	$1,296.25	$1,305.40	N/A	$ 600	$ 500
	S9V2B060U3VSAA	60,000	97.0%	$1,293.00	$1,373.81	$1,383.51	N/A	$ 600	$ 500
	S9V2B080U3VSAA	80,000	97.0%	$1,359.00	$1,443.94	$1,454.13	N/A	$ 600	$ 500
	S9V2C100U4VSAA	100,000	97.0%	$1,564.00	$1,661.75	$1,673.48	N/A	$ 600	$ 500
	S9V2D120U5VSAA	120,000	97.0%	$1,659.00	$1,762.69	$1,775.13	N/A	$ 600	$ 500
Furnace High Efficiency Equipment	AUC1B040A9241A	40,000	92.1%	$ 612.00	$ 650.25	$ 654.84	N/A	$ 0	$ 0
	AUC1B060A9361A	60,000	92.1%	$ 637.00	$ 676.81	$ 681.59	N/A	$ 0	$ 0
	AUC1B080A9421A	80,000	92.1%	$ 648.00	$ 688.50	$ 693.36	N/A	$ 0	$ 0
	AUC1C100A9481A	100,000	92.1%	$ 737.00	$ 783.06	$ 788.59	N/A	$ 0	$ 0
	AUC1D120A9601A	120,000	92.1%	$ 849.00	$ 902.06	$ 908.43	N/A	$ 0	$ 0

Record Request No. 7

Request:

(a) What is the current participation rate of landlord-owned units in the weatherization program compared to the total number of landlord-owned units in Rhode Island?
(b) Please also compare the current participation rate of landlord-owned units in the weatherization program to participation of owner-occupied units.

Response:

(a) The current participation rate of landlord-owned (renter) units in the RI EnergyWise SingleFamily weatherization program is 0.13%. The participation rate is calculated based on the annual average of 2017 and year-to-date 2018 landlord-owned (renter) weatherization jobs (144) divided by the total number of landlord-owned units[1] based on the 2017 Energy Efficiency Program Customer Participation Study[2] (112,590).

(b) The current participation rates of landlord-owned (renter) units and owner-occupied units in the RI EnergyWise SingleFamily weatherization program are 0.13% and 1.38%, respectively. The owner-occupied participation rate is calculated based on the annual average of 2017 and YTD 2018 owner-occupied weatherization jobs (2,928) divided by the total number of owner-occupied units based the 2017 Energy Efficiency Program Customer Participation Study (211,901).

[1] This included all unknown homeownership as renters.
[2] http://rieermc.ri.gov/wp-content/uploads/2018/03/national-grid-2017-ri-ee-customer-participation-study-final.pdf

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Record Request No. 8

Request:

When did the demand savings goal become part of the electric shareholder incentive calculation? (Referencing PUC-1-2, provide the date that the Company began receiving a shareholder incentive for the electric demand savings goal.)

Response:

The demand savings goal became part of the electric shareholder incentive calculation in 2015 as approved in Docket 4527 – The Narragansett Electric Company d/b/a National Grid 2015 Energy Efficiency Program Plan. The Company began receiving a shareholder incentive for achieving the electric demand savings goals in that same program year.

Record Request No. 9

Request:

What portion of the $5 million requested for the RIIB Financing Costs program is expected to support projects that will contribute to National Grid's savings claimed for C&I programs in the 2019 program year and what portion is expected to support projects with savings claimed in future years? Please confirm that the savings associated with the portion of funds expected to support 2019 projects are the amounts included in the Company's energy and demand savings targets for 2019 in Tables E-9 and G-9.

Response:

This response was prepared in consultation with the Rhode Island Infrastructure Bank (RIIB).

RIIB expects that the 2019 $5 million transfer, if approved, will be used to create a pool of approximately $15 million to support comprehensive municipal projects at an interest rate that is substantially lower than the prevailing market rate.

National Grid and RIIB expect that the nearly all of the aforementioned $15 million dollars will be lent in 2019 and that a vast majority of the predicted savings (4,000 MWh and 35,000 therms) will be claimed by National Grid in 2019. The estimated savings are included in the chart below.

However, customer decisions, equipment delivery delays, and a range of other factors make it a challenge to perfectly predict the year in which year savings will be claimed. Many of these same factors also mean that projects evolve over time and that savings may increase or decrease from the original amount estimated.

For example, it is possible that Borrower No. 8 from the chart below, with an estimated completion time frame of fall 2019, has several projects that are nearly complete in December 2019. It is also possible that these projects may not be ready for post inspection until the end of January 2020. In this case, the borrower will have received substantial progress payments from RIIB, but National Grid will not be able to claim savings until the post inspections are complete.

Prepared by or under the supervision of: Benjamin Rivers

Record Request No. 9, page 2

Borrower #	Amount	Improvement Type	Estimated kWh	Estimated Therms	Timing
1	$ 1,200,000.00	Streetlights	400,000		Spring 2019
2	$ 5,000,000.00	HVAC, Insulation, indoor LEDs at Town Hall	100,000	10,000	Summer 2019
3	$ 2,000,000.00	LED lights, HVAC, insullation, other at new firestation	1,000,000		Summer 2019
4	$ 300,000.00	Streetlights	200,000		Spring 2019
5	$ 1,000,000.00	Lights, heating and cooling at town buildings	100,000		Summer 2019
6	$ 2,000,000.00	Streetlights	1,500,000		Summer 2019
7	$ 2,000,000.00	Various EE improvements at municipal buildings	200,000	25,000	Summer 2019
8	$ 1,700,000.00	School Building and Town Building Improvements	500,000		Fall 2019
	$ 15,200,000.00		4,000,000	35,000	

***This chart was used by National Grid and RIIB to estimate savings and time frames for Docket No. 4888**

The Company can confirm that the savings associated with the $15 million pool RIIB will create with the proposed $5 million transfer are included in the energy and demand savings in Tables E-9 and G-9. If anticipated projects related to the Efficient Buildings Fund (EBF) and their associated energy and demand savings do not materialize in 2019, National Grid bears the risk of delivering energy and demand savings set forth in Docket No. 4888.

Prepared by or under the supervision of: Benjamin Rivers

Record Request No. 10

Request:

How many HVAC contractors work with specifically the income-eligible program? Please provide a description of the training that's going to be provided to the *HVAC Coordinators* specifically with regards to air source heat pumps.

Response:

- HVAC contractors that work in the Income-Eligible Services (IES) program are listed in Attachment RR-10(a).

- Air Source Heat Pump (ASHP) training will be provided to contractors that work in the Income-Eligible Services (IES) program. The training presentation is in Attachment RR-10(b).

    - ASHP training will include a specific focus on mini-split check sessions and integrated controls.

- In September 2018 the IES Program, in coordination with the HVAC Electric program, delivered the first ASHP training to contractors that work in the IES program.

- In January 2019 through May 2019 the IES Program, in coordination with the HVAC Electric program, will deliver ASHP trainings to contractors that work in the IES program.

    - Trainings will be delivered by CLEAResult staff and manufacturers, as appropriate.

	RI WAP/IES Contractor
1	American Heating,Plumbing,& Sprinkler,Inc.
2	B&D Boiler Removal
3	Boss Heating
4	Charland Enterprises
5	Comfort Systems
6	Competitive Chimney Sweep Inc.
7	Consumers Propane, Bousquet Oil
8	Dudek Oil
9	Dupuis Oil
10	Howards Heating
11	Micheletti Oil
12	Nite Oil
13	Oceanline Combustion
14	Pecchia Plumbing and Heating
15	Petro
16	Precision Climate Control
17	Stateline Fuel & Burner
18	Shearman Oil
19	T.A. Gardiner Pluming and Heating
20	Vaughn Oil
21	Victor Allienello

Attended the 9/18/2018 Mini Split training

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2018 MS Check Training
Mini Split Heat Pump Diagnostic Procedure

Charlie McCracken

David Parker

New England HVAC Program

What is *MS Check*?

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- A Cooling Mode Diagnostic Procedure for MSHPs Developed and Tested over 3 years

- Uses Superheat and Amps to Determine
  - Proper Charge
  - Under Charge
  - Over Charge
  - Poor Evacuation

What we will discuss today

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- Review
  - 2014 Laboratory testing
  - 2015 Pilot installations
  - 2017 Baseline Study
- ***MS Check*** procedure
  - WIFI reporting
  - Quality Installation
    - Piping, Leak Testing, Proper Tools

Development Work 2014-2017

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- 2014 Laboratory testing
  - Adjusted charge from 33% to 150%
  - Evaluated Superheat, Capacity, Watts
- 2015 Pilot review
  - 35 SH MSHPs with 8 trained contractors
- 2016-17 Multi Head Testing Performed
  - Mitsubishi, Fujitsu, Daikin, LG conform
- 2017 Baseline Study
  - 160 tests on 2016 rebated SH & MH MSHPs

Typical Lab Test Data

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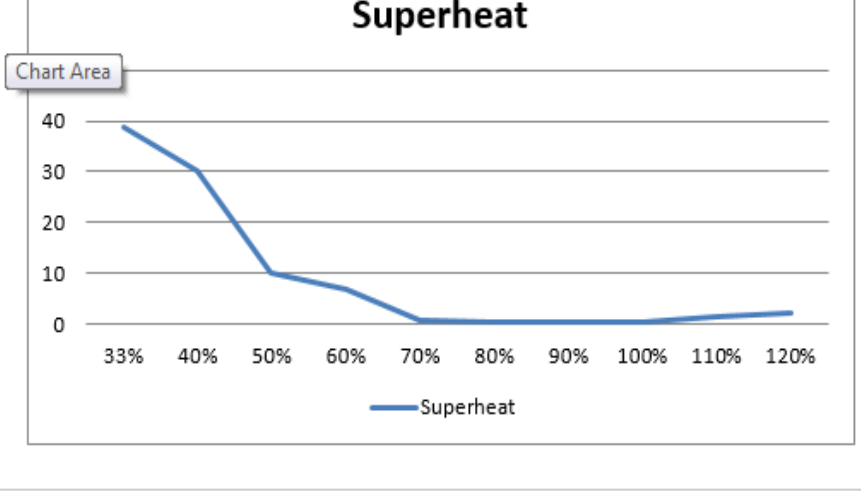
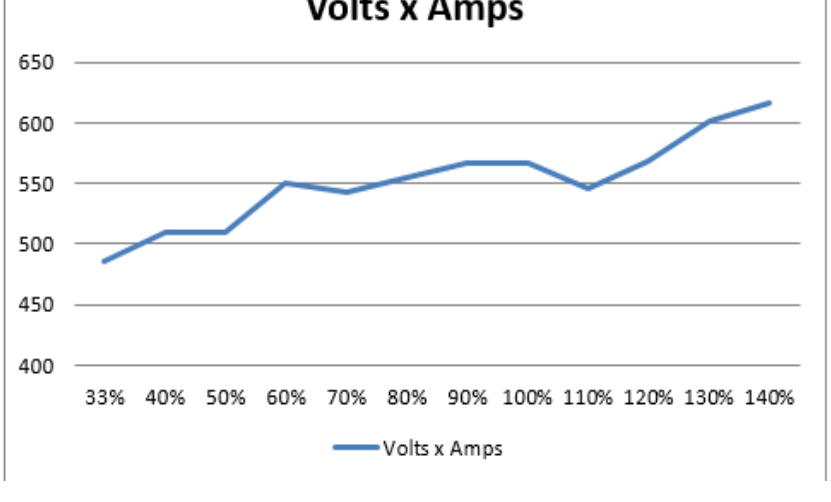
- Mitsubishi FH09
- Tested at the MEA Training Center Southborough, MA
- November 24-25, 2014





Screening Procedure in Cooling

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- Set MSHP into OEM TEST Mode
  - Or set Thermostat 2-3F< Room, Fan on MH
- Should find most significant issues
- Always follow OEM instructions if charge adjustment is indicated

2015 Field Testing

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- 35 Units tested
- Single Zone
- Real World Test Data
  - Developed “Passing” Parameters
  - Superheat <5F and Amps < 110% of AHRI

Yellow Jacket
MANTOOTH

Fieldpiece SRH3 /
SDP-2

Fieldpiece SC77
True RMS

MSHP 2015 Data Reported
SH MSHPs Only

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Date: _____ Time: _____ AM/PM

Condenser Ambient Temp	_____	°F DB
Suction Line Pressure	_____	psig
Vapor Line Temp	_____	°F
Return Dry Bulb Temp	_____	°F DB
Return Wet Bulb Temp	_____	°F WB
Supply Dry Bulb Temp	_____	°F DB
Supply Wet Bulb Temp	_____	°F WB

_____	amps
_____	amps

Undercharged MSHPs

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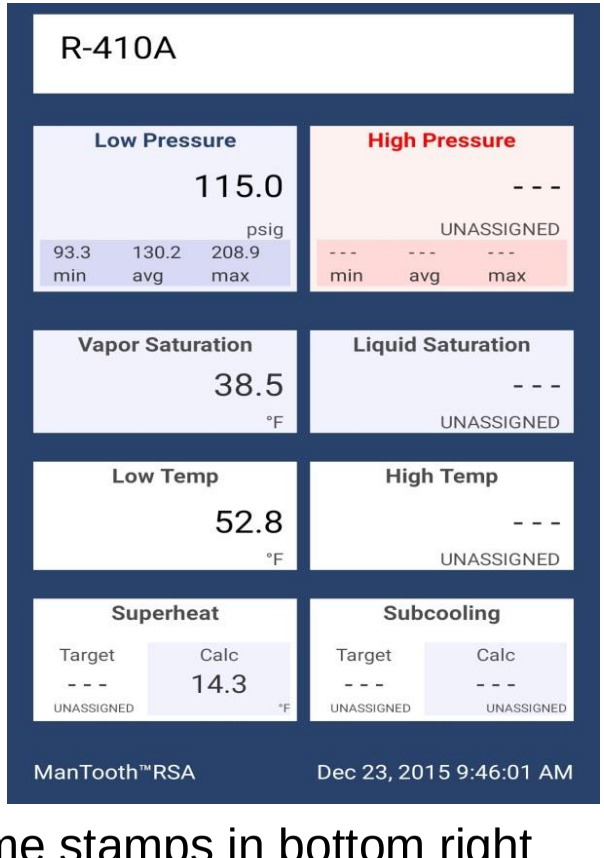
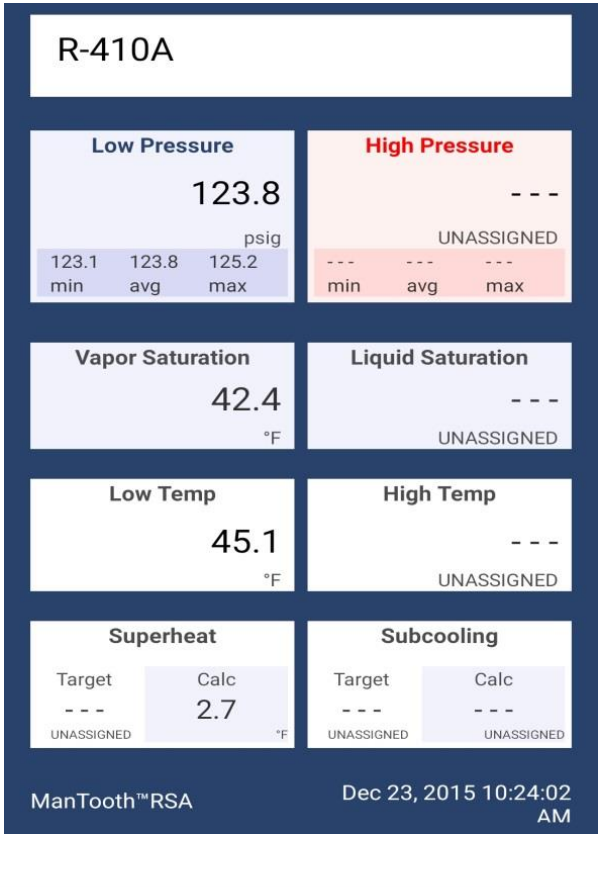
1.5 # Under Charged



100%



- SH> 5F
- Note the time stamps in bottom right

Overcharged MSHP

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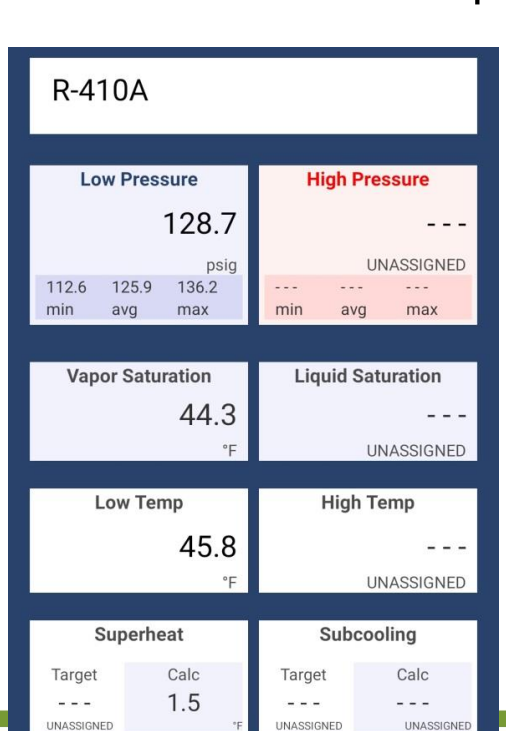
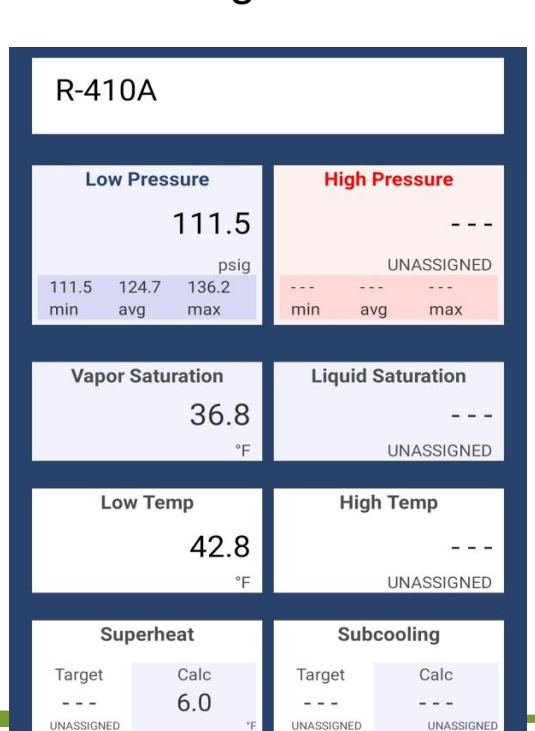
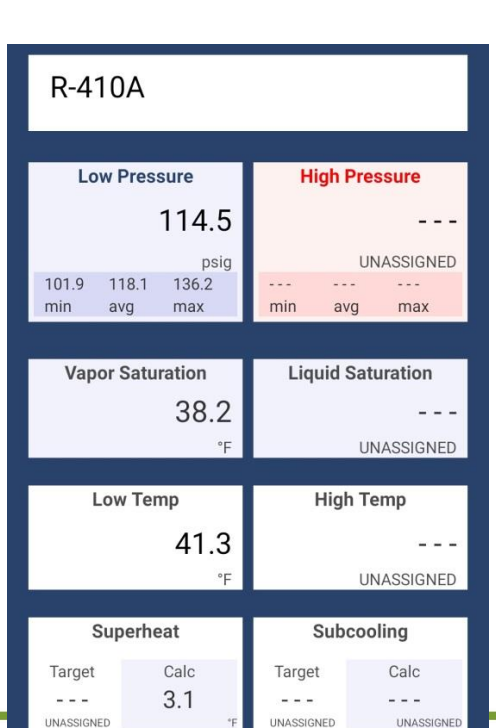
- EEV “Hunts” until 8 oz removed
- Note the time stamps in bottom right







Cooling Mode Diagnoses

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Status	Superheat	Amps (% of AHRI)	Typical Causes
Correctly Installed	< 5 degrees F	< =110%	Correct installation
Undercharged	> 5 F (often >10)	N/A	Leaky flare connection No charge adjustment made
Overcharged	Fluctuating, 5-10F	> 110%	Too much refrigerant added
Line set contamination	Approx. 5F	> 110%	Incorrect vacuum applied/ moisture in line

Amperage from published AHRI rated conditions of 95/80/67F at 230 volts

NEEP MSHP Listing 2016 Summary

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COOLING Capacity (BTUH) at AHRI 95/80/67	COOLING Watts at AHRI 95/80/67 @ 230 volts	COOLING Amps at AHRI 95/80/67 @ 230 volts	COOLING MassSave H&C Tier 1 18/9 Tier 2 20/11
Ave. 9,000	615	2.8	1
Ave. 12,000	912	4.2	1
Ave. 15,000	1,158	5.3	1
Ave. 18,000	1,370	6.3	1
Ave. 24,000	1,609	7.4	1
Ave. 9,000	578	2.6	2
Ave. 12,000	898	4.1	2
Ave. 15,000	1,111	5.1	2
Ave. 18,000	1,400	6.4	2
Ave. 24,000	1,760	8.1	2

2017 Study SH & MH MSHPs

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- MH systems had most charge & wiring issues (i.e. indoor head wired to wrong circuit)
- Low Charge Most Common Flaw, found in 12% (1 out of 8) of all systems
- Amperage Mirrors Ambient Temperature (i.e. uses 75% of AHRI rated amps on 75F day)
- Most contractors Mass CEC eligible (AC Check participants or not)
- Contractors invited to observe & notified of issues
- No repairs by program staff

Multi Head MSHP Evaluation

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LG 4 ton/5 zone MSHP

RST Thermal, Westwood MA,

April 4, 2017

Installed/Attached Capacity	=	51,000 BTUh
Rated EER as Configured	=	10.3 EER
BTUh / EER = Watts	=	4,950 Watts
Watts / 230 volts (AHRI)	=	21.5 Amps
Training Room Temp.	=	71F
Expected Amps = 15.3 A	=	71% of 21.5 Amps
Measured Amps OEM iPad	=	12.5 Amps
Measured Amps Multimeter	=	13.6 Amps
Measured Superheat	=	3.1F

Passing Goal <5F Superheat and <110% AHRI Amps

MSHP Evaluation - Existing System (2016)

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Mitsubishi MUZ-GE18NA MSHP

Chaves H&C Training Room, Hudson MA,
February 22, 2018

Installed/Attached Capacity	=	17,200 BTUh	(for specs…)
Rated EER as Configured	=	10.5 EER	(ask Google)
BTUh / EER = Watts	=	1,638 Watts	
Watts / 230 volts (AHRI)	=	7.1 Amps	
Training Room Temp.	=	79F	
Expected Amps = 5.6 A	=	79% of 7.1 Amps	
Measured Amps UEI meter	=	5.3 Amps	
Measured Amps F/P meter	=	5.8 Amps	
Measured Superheat	=	4.3F	

Passing Goal <5F Superheat and <110% AHRI Amps

Cooling Mode Diagnosis
SH and Amps Can Diagnose Charge Conditions

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Status	Superheat	Amps (% of AHRI)	Typical Causes
Correctly Installed	< 5 degrees F	< =110%	Correct installation
Undercharged	> 5 F (often >10)	N/A	Leaky flare connection
Overcharged	Fluctuating, 5-10F	> 110%	Too much refrigerant added
Line set contamination	Approx. 5F	> 110%	Incorrect vacuum applied/ moisture in line

How to Calculate Amps for any MSHP

9,000 BTU Tier 2 MSHP AHRI 16.1 EER = 560 Watts

Watts / Volts = Amps

560 w/ 230 v = 2.4 amps at AHRI Rated Conditions (95F ambient 80F IDB 50% RH at 230 volts)

Example Analysis

Measured SH = 3.2F Measured Amps = 2.6 amps = 107% of AHRI **PASS!**

MS Check Test Preparation

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- 1-Shutoff Power to MSHP at Outdoor Electrical Box
- 2-Remove all Service Covers on Condenser
- 3-Connect Ammeter on L1 (No Voltage Readings)
- 4-Turn on Power to the MSHP at Outdoor Electrical Box
- 5-Clear any Furniture Preventing Access to Indoor Units
- 6-Measure and Record the Following Temperatures
  - Outdoor Ambient Air Entering Condenser
  - Return Air at Indoor Unit Inlet or Return Air Grille
  - Measure up to 3 Indoor units for RA-db & RA-wb

MS Check Test Procedure

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- 1-Place System in COOLING TEST mode per OEM instructions.
  - Many OEMs have Emergency COOL button. Refer to OEM manuals for instructions MH systems.
  - If No TEST mode, place indoor fan on MH and drop remote stat 2-3F< RA DB
- 2-Record time Compressor, not Condenser Fan, starts
- 3-Connect Digital Gauge to Condenser Suction Port
- 4-Place pipe clamp on copper line to measure Suction Line temperature

MS Check Test Procedure

TEST Mode and Return Air Temperature Locations

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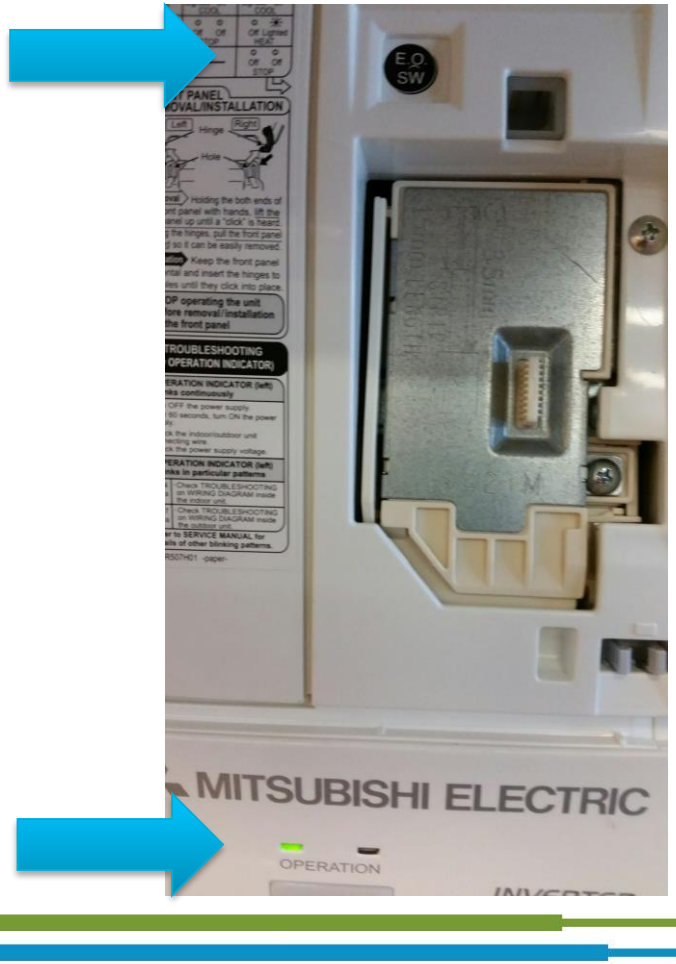

MS Check Test Procedure

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- 5-After 10 minutes of Operation, Record:
  - Suction Pressure
  - Suction Saturation Temperature
  - Suction Line Temperature
  - Amperage (on L1 only)
- 6-Disconnect gauge while system is running
- 7-Measure & Record:
  - SA-db and SA-wb at indoor unit
  - (up to 3 operating indoor units if MH system)

MS Check Test Procedure
Supply Air Temperature Location

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Upon Completion of Testing…..

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- ***Verify Normal System Operation!***
- ***1-Disconnect power***
- ***2-Replace all covers and reset power***
- ***3-Test operation by MSHP remote control with customer present***

MS Check Mobile DRAFT

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Company _____ ← **From Pull Down Menu**

Customer Name: _____ ← **Office/Tech Input**

Address: _____

City: _____ State: MA Zip: _____

Enter AHRI # to Provide All Equipment Data ← **Office/Tech Input**

Condenser **Manufacturer:** _____ **Model:** _____

Serial number: _____ ← **Tech Input**

Evaporator **Manufacturer:** _____ **Model:** _____

Evaporator **Manufacturer:** _____ **Model:** _____

Evaporator **Manufacturer:** _____ **Model:** _____

MS Check Mobile DRAFT

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Tech ID

Test #1

Date: Time: AM/PM

Condenser Ambient Temp	°F DB
Suction Line Pressure	psig
Vapor Line Temp	°F
Return Dry Bulb Temp	°F DB
Return Wet Bulb Temp	°F WB
Supply Dry Bulb Temp	°F DB
Supply Wet Bulb Temp	°F WB

Outdoor Unit: L1 amps

Quality Installation Checklist

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- Sizing
- Piping
- Condensate
- Line Set Covers
- Clearances
- Wall Mounts/Stands
- Surge Protector?
- Homeowner Education

Sizing & Selecting

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Getting Load Calculations Right

Cooling oversize is mitigated by variable-speed equipment; if minimum speed cooling capacity is over 130% of design cooling load, look for equipment with a higher ratio of heating to cooling capacity, or a larger turn-down ratio (a lower minimum capacity), or both.

Sizing & Selecting

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Full Heating System Replacement

Typically, previous HVAC is hydronic or steam distribution, or existing ductwork is leaky, poorly insulated, fully or partially in attic, garage or vented crawlspace. Pre-existing system is decommissioned or possibly removed. (In some cases, existing ducts may be used when they are located in conditioned space, are adequately sized for required heat pump air flow, and a suitable indoor unit air handler can be selected).

Sizing & Selecting

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Isolated Zone

One room or zone that is otherwise thermally isolated from the rest of the home. This may be a newly finished basement room, build out above garage, an addition, or a room that previously had poor thermal comfort.

Quality Installation Checklist
from 2015 Pilot

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Quality Installation Checklist

- ☐ AHRI Listed: meeting at least 18 SEER / 9 HSPF or higher.
- ☐ Was a Manual J V8 load calculation performed? (Not a requirement)
- ☐ Continuous piping insulation, at minimum R-3 or 3/8" in thickness, is required.
  In no application should there be more than 2" of exposed copper piping following installation.
- ☐ Refrigerant lines must be leak tested and evacuated per manufacturer's recommendations.
  This may be either the deep vacuum or triple evacuation method.
- ☐ All visible line sets must run through line set covers, sized accordingly to fit the number of line sets used. Covers are level and/or plumb, meeting the expectations of the homeowner.
- ☐ Refrigerant lines meet the manufacturer's minimum and maximum lengths.
  If longer than the precharged distance, technician added _____ oz. per _____' of line set.
- ☐ Condensate piping should be terminated outside in the shortest, most vertical and direct way possible. Condensate shall not terminate over walkways where accumulating/not draining properly could damage building components.
- ☐ Equipment installation shall meet all manufacturers' specified clearances.
  Typically side-discharge, these condensers require at least 4" between the condenser and any obstruction like a wall.
- ☐ Outdoor equipment in heating dominated climate shall be placed on a stand or wall mounted, at minimum 6" above grade, or above the seasonal snow line as recommended by local code.
- ☐ Condenser should be protected with a UL listed surge protector, either whole home or individual.
- ☐ System operation was explained to homeowner, to include: avoiding large set backs and use of auto changeover.

Installation Best Practices
Line Set

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- Follow manufacturer's instructions for minimum and maximum line set length and height change.
- Insulation must cover entire line set length (both pipes) to avoid condensation and energy loss. Once insulated, protect the outdoor portion of line set with a rigid cover to avoid insulation damage.
- Add UV tape as needed to ensure that any remaining exposed insulation is protected.
- Line set penetration through the building enclosure should be made rodent-proof (e.g. with PVC sleeve and cap drilled to the size of the refrigerant lines).
- All penetrations through the shell of the home must be sealed with insulating sealant/spray foam; any insulation disturbed by installed line set must be returned to original (or better) condition.

Single Zone Condensers

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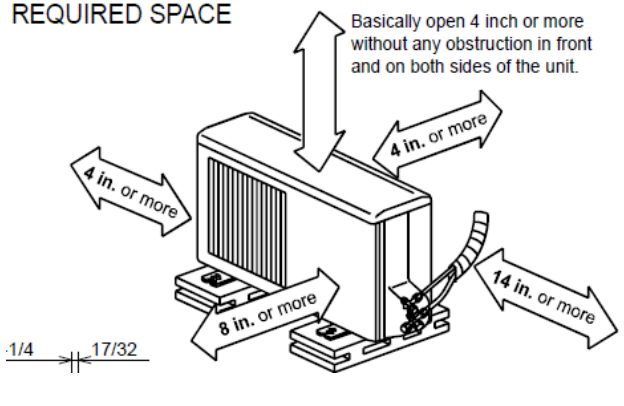
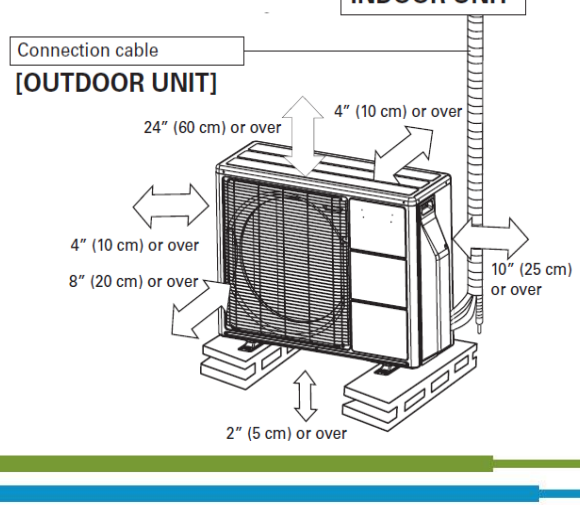
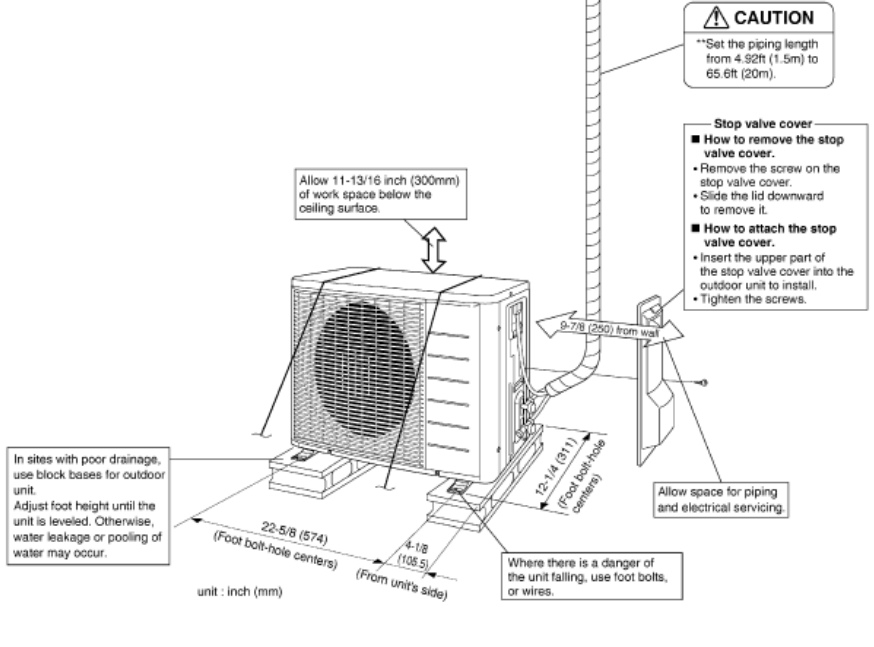
Mitsubishi



Fujitsu





Daikin

Quality Installation Best Practices

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- Consider Using Line Sets with Better Insulation

3/8” Insulation

1/2” Insulation
Tear/UV Resistant
Mold/Mildew Resistant
Meets Flame/Smoke Rating

Buy a New Flaring Tool and Use Torque Wrenches

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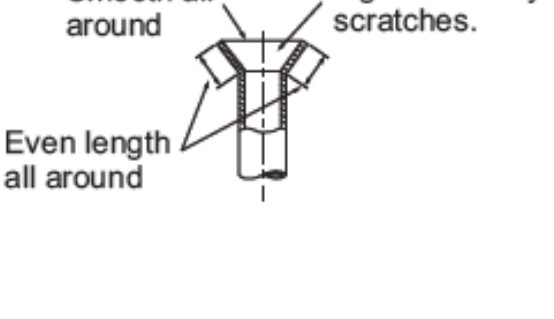

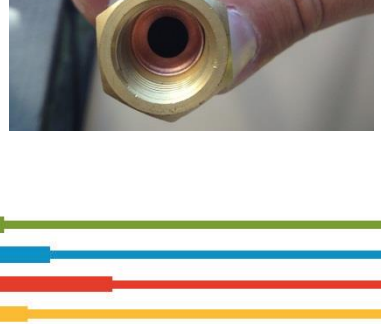

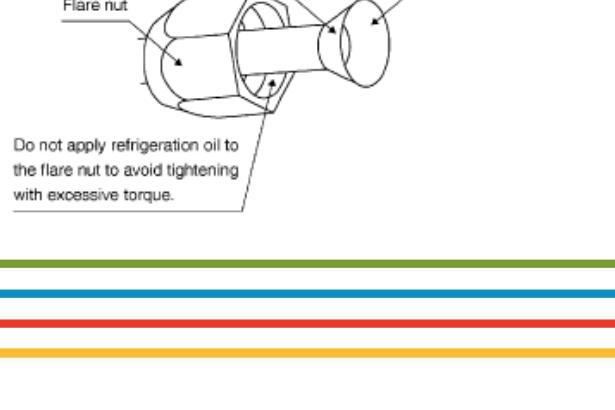

Do a Proper Leak Test and Evacuation

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Evacuate Refrigerant Lines

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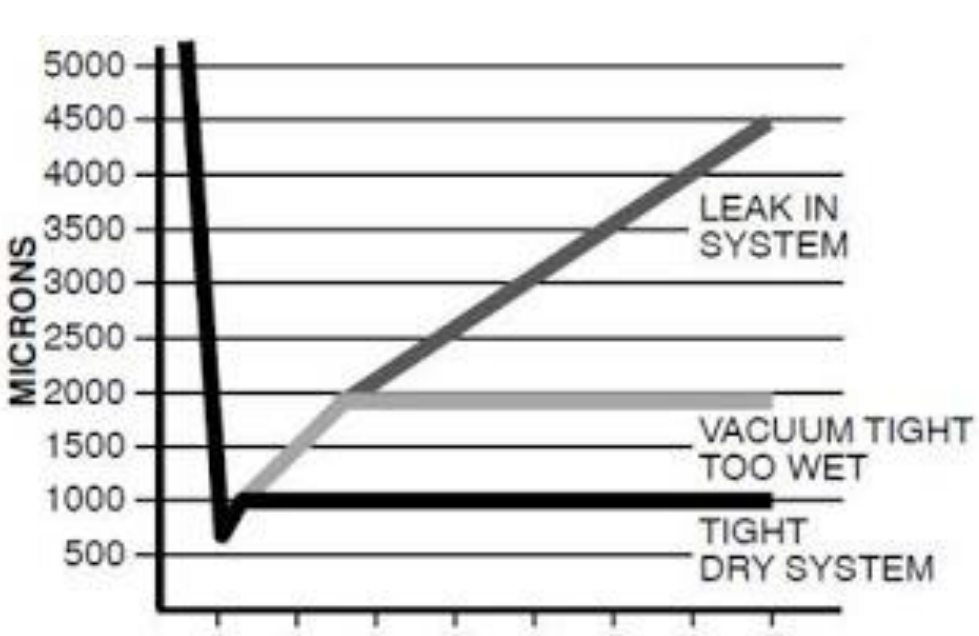
- Some OEMs DO NOT specify



Deep Vacuum Chart; Carrier Service Manuals

Screening Procedure in Cooling

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- Could be used by:
  - Program QA
  - Contractors to QA technicians
  - Quick determination if system charge is the cause of a customer comfort or bill complaint

Setbacks

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1. Setbacks *don't* save energy
   a. Low capacity = long recovery, in high speed mode
   b. Night setback = recovery at lowest outdoor temps
   c. Both of these result in least efficiency operation
2. Better to "set it and forget it"
   a. Use modest setback for several days away

Night Setback & Inverter MSHPs

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- Temperature setbacks (on/off operation)…
  - One homeowner complained of temperature unevenness
  - When the data were examined, it was clear that they operated their MSHP in an “on-off” manner rather than using a fixed set point.
  - This resulted in wide swings in interior temperature (between 60° F and 70° F+).
  - The electricity use showed many hours with the MSHP running at maximum capacity (~2000 W), followed by periods with the unit shut off.
  - Electricity consumption was by far the worst among all monitored houses; when compared with simulations, it was the worst-performing house
  - Heating use 57% higher than simulation.”

Ueno and Loomis, 2015 DOE-Building Science Corporation; Long Term Monitoring of Ductless MSHP in Northeast

Customer Checklist
Provided by Efficiency Maine

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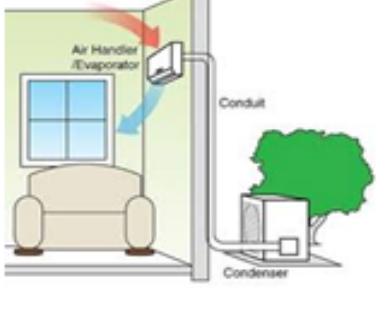
User Training

1. Adjust for comfort, not specific temp
2. Don't direct airflow at sitting area
3. Maximize heat pump/min. backup
4. Maximize the heat zone
5. Avoid "Auto" mode
6. Use "Auto fan" mode
7. Clean filters
8. Keep outdoor unit clear and clean
9. Ignore cycling and gurgling
10. Keep service contact information



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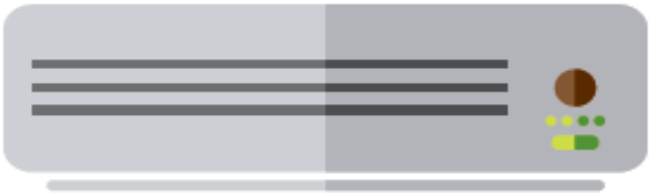
FIRST CAME THE INSTALLATION. NOW COMES THE SAVINGS.

Your new mini-split heat pump could cut your heating and cooling costs by 30%. **Here's how to get the biggest savings.**



1 Fuel for thought.

Mini-splits aren't just for cooling. Today's cold-climate models can also be used as your primary heating system to reduce your overall heating costs without sacrificing comfort. If you kept your old heating system as a back-up, find your fuel type in the chart below to see how you can save the most money on heating.

mass save heating & cooling

MASSACHUSETTS CLEAN ENERGY CENTER

YOUR OTHER HEATING SYSTEM'S FUEL TYPE

Electric	Propane	Oil	Natural gas
Use your mini-split as your primary heat source.	Use your mini-split as your primary heat source.	Use your mini-split as your primary heat source when outdoor temperature is above 25°F.	At current fuel prices, natural gas systems are more cost-effective than mini-splits.

2 Set it and forget it.

Much like how your car gets better gas mileage driving at a constant highway speed rather than stop-start traffic, your mini-split operates most efficiently when left alone. This allows its variable-speed fan to mostly stay in its lowest, most efficient setting and only power up when necessary.

CRUISE CONTROL FOR YOUR HEATING SYSTEM

To avoid wasting energy, leave the fan in auto mode and set the mini-split unit to "**heat**" in the winter or "**cool**" in the summer—and to whatever temperature you feel most comfortable. Then, walk away.

The exception is when you're going away from home for a few days. Feel free to adjust the temperature to save energy while you're out.

3 Focus on your comfort, not the number.

Because a mini-split's temperature sensor is typically located in the warmer air near the ceiling, you may have to set your heating temperature a few degrees above normal to get the comfort you're used to.

TURN IT UP

74°

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4 Heat down and cool up.

To get the most savings, set the fan speed to auto and direct warm air at the floor and cool air upwards. Because warm air rises, this allows the conditioned air to circulate throughout the room.

Keep the air flowing by opening doors between rooms, unless you only want one space conditioned.

IT'S A TWO-WAY STREET

5 A little maintenance goes a long way.

Severely neglected mini-splits can use up to 25% more energy than well-maintained ones.

SHOW YOUR MINI-SPLIT SOME LOVE

Filters	Airflow	Service
Regularly clean the indoor dust filters. Check manually or look for the indicator light.	Keep the outdoor unit clear of leaves, snow, ice and debris. Proper airflow (and staying unfrozen) is essential.	Have your outdoor unit professionally serviced every 1–2 years so it lives a longer, happier life.

6 Seal in your savings.

Don't let your mini-split's hard work go to waste. For maximum efficiency, make sure your home has enough insulation and is free of drafts.

Learn more about sealing of air drafts and insulation rebates at MassSave.com/HEA, or call us at 866-527-SAVE (7283).

NO LEAKS HERE

Looking for more ways to save?
Visit MassSave.com and MassCEC.com for energy-saving tips and available rebates.

Proud sponsors of Mass Save:

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EVERSOURCE

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Unitil energy for life

2019 Mass Save / RI Electric H&C Programs

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- Rebates to encourage Green House Gas (GHG) reduction by using ASHPs to displace Oil and LP
- ASHPs heat to comfort and economic “balance point” 25-40F
- Integrated controls switch to Oil or Propane conventional heating system in colder weather
- Qualified Product List (QPL) only, OEM documented

New for 2019
Integrated Control Specification

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Integrated Controls for Cold Climate Heat Pump/Fossil Fuel Systems
Proposed Specification for 2019 Mass Save Heating and Cooling Program

Charlie McCracken
CLEAResult NEHVAC Programs
11.19.18

The 2019 Mass Save Heating and Cooling program (the H&C Program) has identified the use of heat pumps as a beneficial method for assisting the state of Massachusetts in achieving its Greenhouse Gas emissions reduction goals; the "80/50" goal. The development and installation of Integrated Controls (IC) to use an air source heat pump (ASHP)for space heating for a significant portion of the heating season is a technical and economical method for forwarding this objective. These controls are intended to operate the heat pumps as primary equipment, with existing fossil fuel equipment (specifically fuel oil and propane) as secondary heat during colder weather. 2019 Mass Save H&C program incentives will be offered to subsidize the implementation of this strategy.

This specification is intended to define acceptable IC installations. Only systems that meet these criteria will be eligible for Program incentives.

1. The installed IC system will provide automatic changeover from Heat Pump to existing heating system operation by one of two acceptable strategies
   a. Balance point operation (suggested at 25F-35 outdoor ambient temperature) or
   b. Simultaneous operation, aka "Droop", with existing heating system set 2-3F lower than ASHP, both systems powered, with a 15F Balance Point for ASHP changeover.
2. IC configurations must be supported/documented by OEM instructions, wiring diagrams, and schematics (either from the equipment or control manufacturers) to facilitate troubleshooting in the event of control or equipment failure in the future. Field fabricated control strategies not supported by OEM documentation will not be Program eligible.
3. IC strategies shall have an indoor thermostat or temperature sensor (wired, wireless, infrared, wifi or other) for each indoor heating. The thermostat/sensor shall be set in a location appropriate for the space being conditioned and must be mounted or set in the Occupied Zone, 2-5 feet off the floor (the "comfort zone") and provide temperature control and Occupied Zone temperature readout. Temperature readout and control may be provided using a wifi app on mobile device. The thermostat/sensor setting must reflect actual Occupant Zone temperature. For ductless systems, each head must be controlled by the IC system.
4. IC systems shall have a method to switch from Heat Pump to fossil fuel heating system operation or vice versa (i.e. a "bypass switch"), if one of the heating systems malfunctions, without requiring OEM software application acceptable

New for 2019
Integrated Control Incentives

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New for 2019
Integrated Control Incentives

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WIFI Start Page

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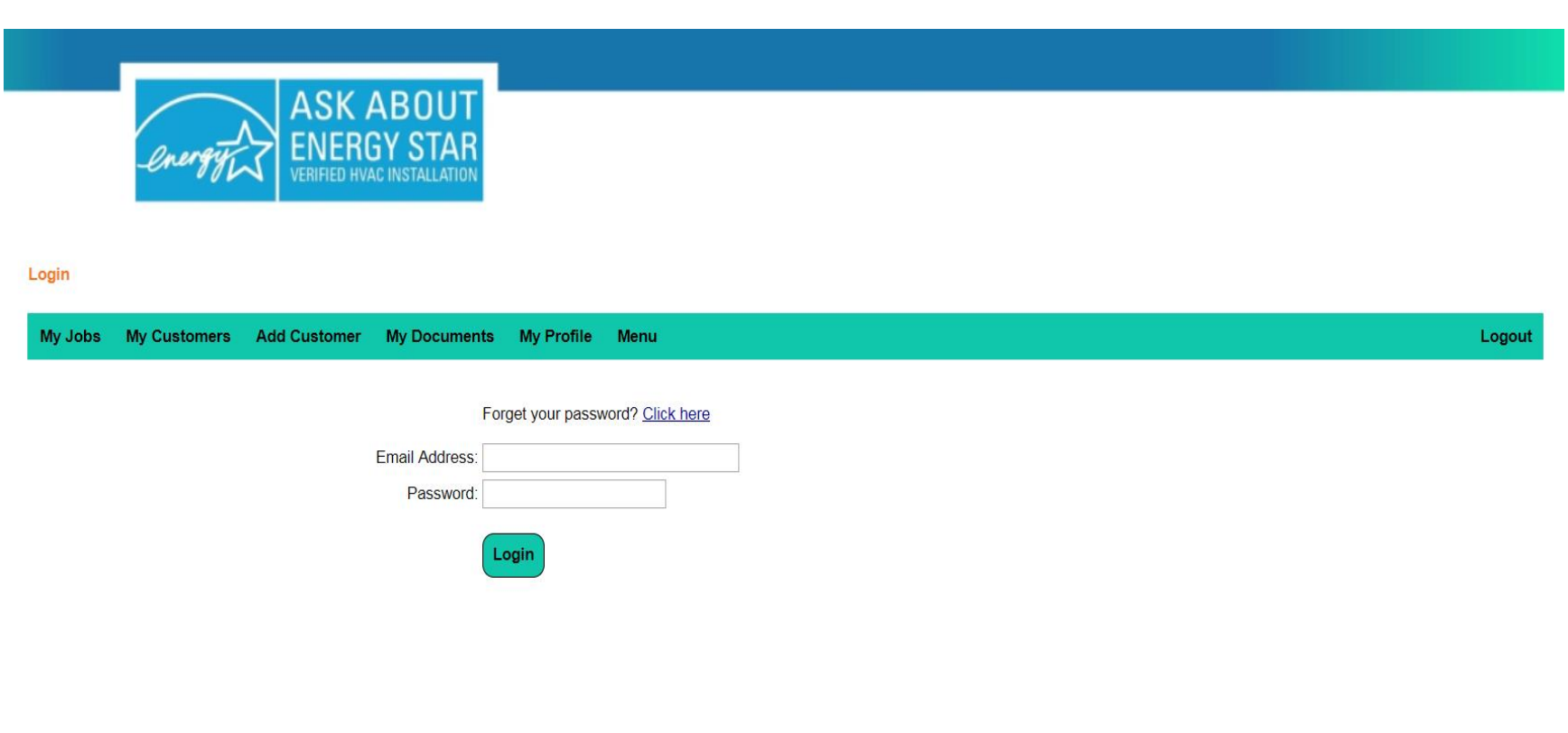

WIFI Contractor Jobs Page
"Portal" of all Saved/Submitted Tests

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My Jobs

My Jobs | My Customers | Add Customer | My Documents | My Profile | Menu | Logout

Add Job | Search Jobs

Contractor	Job Type	Job Name	Customer	Address	Testing Tech	Status	Status Date	
CLEAResult	Duct Sealing 2018	duct seal test	CLEAResult, Test	123 Main St		Enrolled	3/23/2018	✕
CLEAResult	New Central AC 2018	CAC test	CLEAResult, Test	123 Main St		Corrections Needed	3/23/2018	✕
CLEAResult	New Central AC 2018	dd,dd	dd, dd	dd		Enrolled	3/22/2018	✕
ESI	New Central AC 2018	ac	MASS Last Name, First Name	123 Main St		Enrolled	3/2/2018	✕
ESI	New Central AC 2018	hhdhd	MASS Last Name, First Name	123 Main St		Enrolled	3/5/2018	✕
ESI	New Central AC 2018	hhdhdf	MASS Last Name, First Name	123 Main St		Enrolled	3/5/2018	✕
ESI	New Central AC 2018	nat grid ma cac	MASS Last Name, First Name	123 Main St		Enrolled	3/2/2018	✕
ESI	New Central AC 2018	test 2	MASS Last Name, First Name	123 Main St		Enrolled	3/2/2018	✕
CLEAResult	New Central Heat Pump 2018	CHP test	CLEAResult, Test	123 Main St		Denied	3/23/2018	✕
CLEAResult	Service Central Heat Pump 2018	service chp test	CLEAResult, Test	123 Main St		Enrolled	3/23/2018	✕

WIFI Customer Information

1st Screen of Data Entry-New Job

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ASK ABOUT ENERGY STAR
VERIFIED HVAC INSTALLATION

Add Customer

My Jobs | My Customers | Add Customer | My Documents | My Profile | Menu

> Customers > Add Customer

Customer Type:	(•) Residential ( ) Non-Residential
First Name:	
Last Name:	
Installation Address:	
City:	
State:	
Zip Code:	
Email:	
Phone:	

Save Customer

WIFI Job Information

2nd Screen of Data Entry—Save for Tech

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Sponsor Info | **Equipment** | Indoor Unit Testing | Refrigerant Charge | Reports

Rebate Eligible?	Yes	Changing this value will reset the survey answers from this point forward
Early Replacement	Yes	Changing this value will reset the survey answers from this point forward
How old is the existing condensor? (years)	14	
Qualify for contractor downsizing incentive?	Yes	Changing this value will reset the survey answers from this point forward
Old Condensor Tons	5	
Photo of old condenser in place uploaded?	Yes	
Photo of nameplate of old condenser uploaded?	Yes	
Manual J Uploaded	Yes	
Enter New Equipment Info	Yes	Changing this value will reset the survey answers from this point forward
Year Installed	2018	
Unit #	1	
Unit Location	1st floor	
Air Conditioner AHRI Reference #	5947287	
Condenser Manufacturer	None of the above	lennox
Condenser Model Number	xc25-036	
Rated SEER	22	
Rated EER	15	
Rated Cooling Btu Total	36000	
Compressor Type	Inverter	
Coil or Airhandler Manufacturer	Amana	
Coil or Airhandler Model	coil mod	
Coil Installed on a furnace?	Yes	

Save

WIFI Test Information
1st Page of Tech Data Entry-Outside

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Customer: CLEAResult, Test (CLEAResult, Test) (View More) (View / Edit Customer Info)
Job / Job Type: CAC test / New Central AC 2018

Sponsor Info | Equipment | Indoor Unit Testing | **Refrigerant Charge** | Reports | Comments

Date of Test	3/7/2018
Time of Test	9:15 AM
Tech First Name	tim
Tech Last Name	hanes
Tech ID	1
Condenser Serial Number	3333333
Metering Device	Fixed Orfice ▾ Changing this value will reset the survey answers from this point forward
Refrigerant	R 22 ▾
Split Systems Line Set Length (Ft)	
Line Set Elevation (Ft)	
Condenser Entering Air DB Temperature	
Liquid Line Pressure	
Condenser Saturation Temperature	
Suction Line Pressure	
Evaporator Saturation Temperature	
Liquid Line Temperature	
Suction Line Temperature	
Condenser L1 Amperage	

Save

If you'd like to erase your answers and restart the survey, click Re-Start Survey below

WIFI Test Information

2nd Page of Tech Data Entry-Indoors

SAVE to Submit for Results

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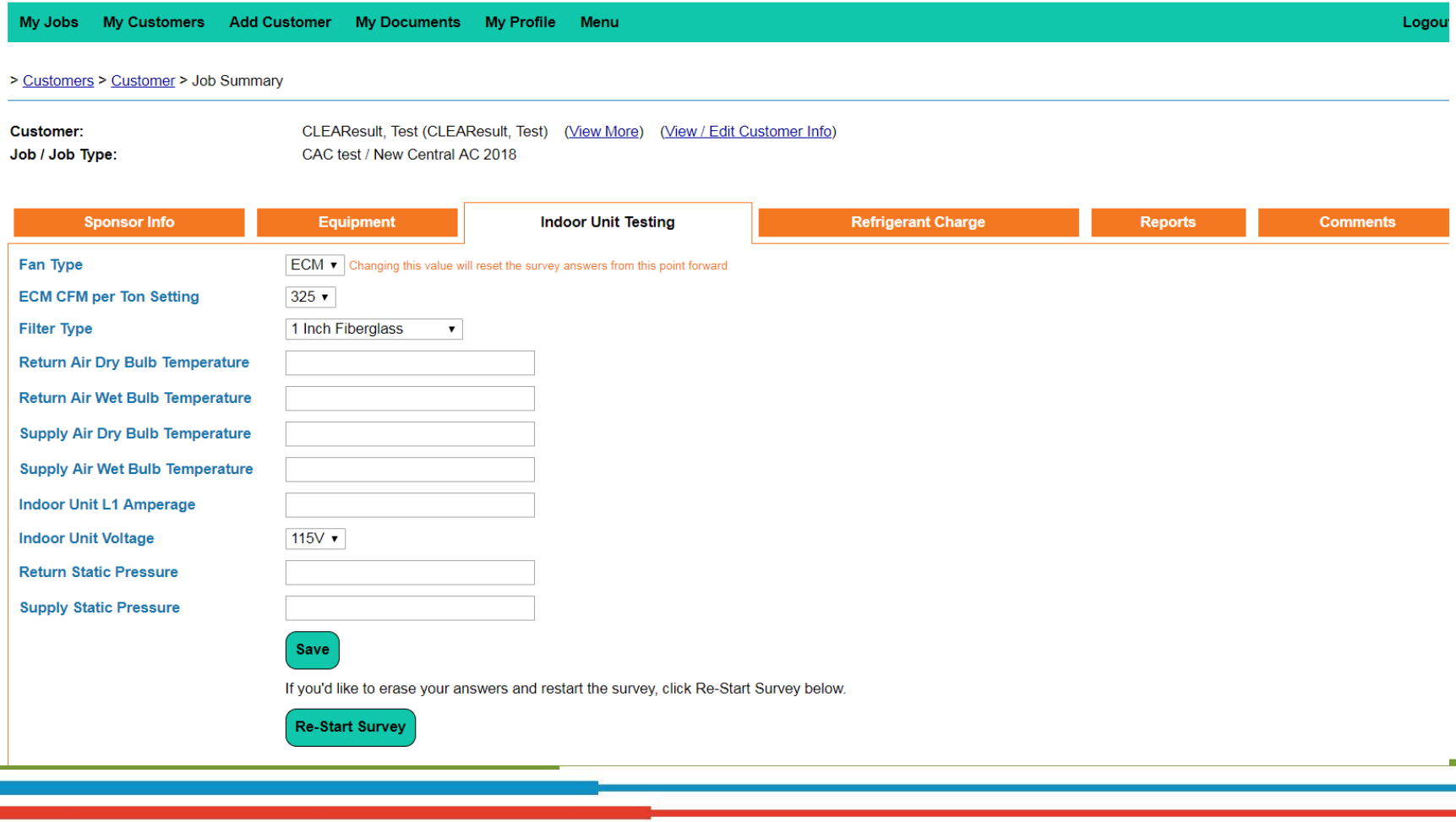

WIFI Test Status
Results P/F in Development

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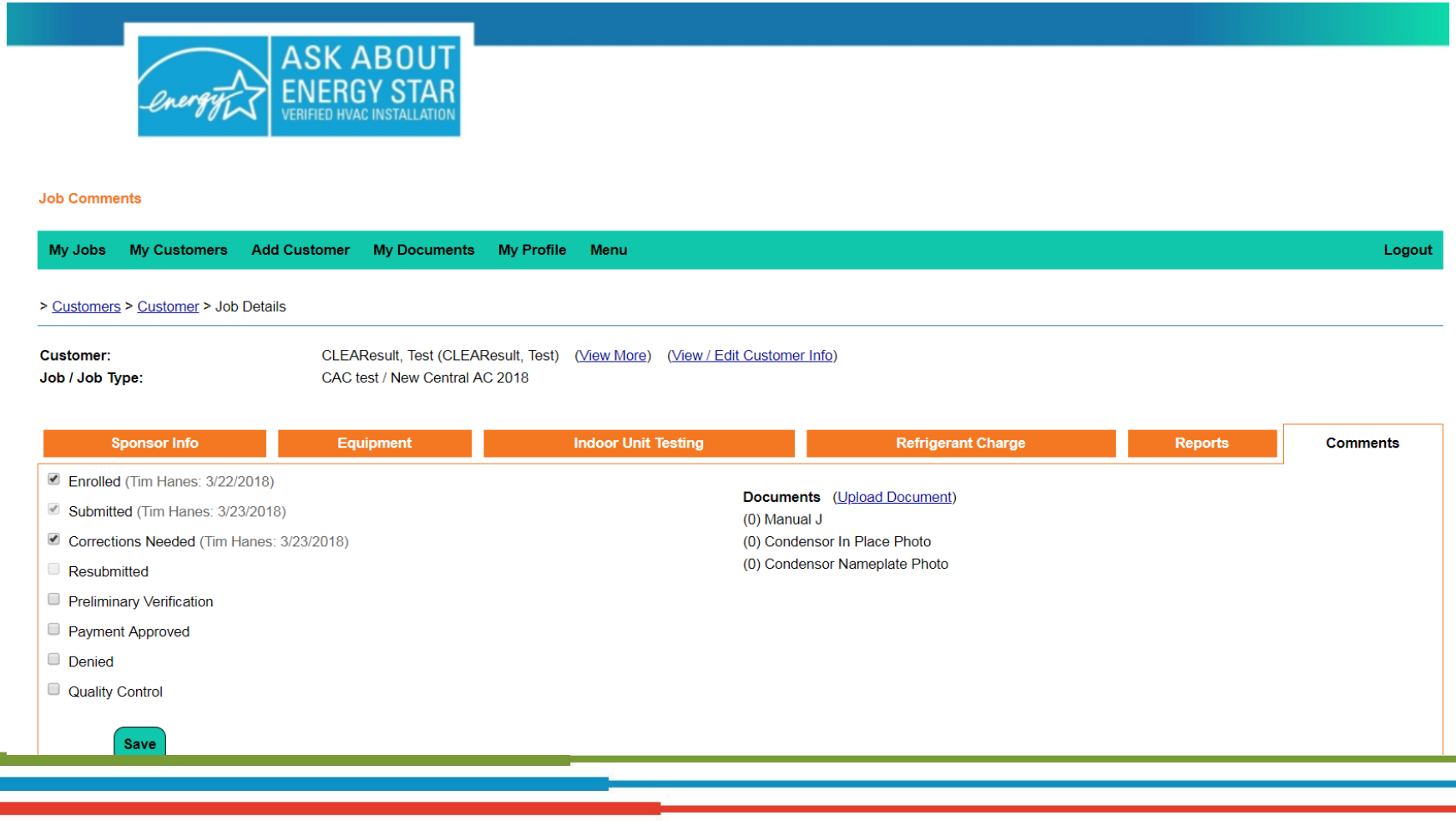

Contractor Support Resource

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Phone: 844-615-8315

Email: HVAC@clearesult.com

Mass Save Electric Heating & Cooling

Rhode Island Electric Heating & Cooling

c/o CLEAResult

50 Washington Street

Westborough, MA 01581